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EFFECTIVENESS OF A PROGRAMED TEXT IN TEACHING GYNECOLOGIC ONCOLOGY TO JUNIOR MEDICAL STUDENTS, A SOURCE BOOK ON THE DEVELOPMENT OF PROGRAMED MATERIALS FOR USE IN A CLINICAL DISCIPLINE.

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*PROGRAMED INSTRUCTION, *MEDICAL SCHOOL, *EXPERIMENTAL PROGRAMS, *CONTROL GROUP, *LINEAR PROGRAMING, COLLEGE STUDENTS, CONVENTIONAL INSTRUCTION, TESTING, TEACHING METHODS, MEDICAL COLLEGE ADMISSION TESTS (MCAT), MEDICAL COLLEGE OF GEORGIA, AUGUSTA, GEORGIA

THIS REPORT DESCRIBES A STUDY TO DETERMINE WHETHER PROGRAMED INSTRUCTION COULD BE USED TO IMPROVE THE TEACHING OF THE MANAGEMENT OF PATIENTS WITH GYNECOLOGIC NEOPLASMS TO JUNIOR MEDICAL STUDENTS. TWO PROGRAMED TEXTS WERE PREPARED--(1) A 'CONTENT' TEXT, AN 830-FRAME LINEARLY PROGRAMED TEXT DESIGNED TO REPLACE CONVENTIONAL CLASSROOM TEACHING OF GYNECOLOGIC ONCOLOGY, AND (2) AN 'APPLICATION' TEXT, A 713-FRAME BRANCHING TEXT CONSISTING OF 35 CASE PRESENTATIONS OF PATIENTS WITH REPRESENTATIVE PELVIC TUMORS AND RELATED CONDITIONS. THE PROGRAMING SYTLE USED COMPLEX BRANCHES AND LOOPS, CODED INFORMATION-GATHERING FRAMES, AND REMEDIAL REFERRALS TO 'CONTENT' TEXT IN AN ATTEMPT TO SIMULATE ON PAPER THE CRITICAL DECISION-MAKING PROCESSES INVOLVED IN 'WORKING UP' AND CARING FOR REAL PATIENTS. AT THE MEDICAL COLLEGE IN 1963-64, AND AT FIVE OTHER MEDICAL SCHOOLS IN 1964-65, EXPERIMENTAL STUDENTS RECEIVED THE 'CONTENT' PROGRAMED TEXT AS A SUBSTITUTE FOR THE CONVENTIONAL CLASSROOM INSTRUCTION GIVEN TO THE CONTROL GROUPS. AT THE MEDICAL COLLEGE IN 1964-65, CONTROL STUDENTS RECEIVED THE 'CONTENT' TEXT AND EXPERIMENTAL STUDENTS RECEIVED BOTH TEXTS. NO LECTURES WERE GIVEN. THE SUPERIOR PERFORMANCE OF EXPERIMENTAL STUDENTS WAS ACHIEVED WITHOUT AN INCREASE IN THEIR STUDY TIME OVER THAT OF CONTROL GROUPS, AND WITH A SAVING OF FACULTY TIME EQUIVALENT TO THE TIME SPENT IN THE PREPARATION AND PRESENTATION OF THE COURSE S CONVENTIONAL INSTRUCTION. THE REACTION OF NEARLY ALL STUDENTS TOWARD BOTH TEXTS WAS POSITIVE. THE STUDY PRODUCED THREE PROGRAMED TEXTS, BUT ADEQUATE FIELD TESTING OF THESE TEXTS NEEDS FURTHER DEVELOPMENT AND VALIDATION OF APPROPRIATE CRITERION MEASURES. (JL)

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FINAL REPORT

EFFECTIVENESS OF A PROGRAMMED TEXT IN TEACHING GYNECOLOGIC ONCOLOGY TO JUNIOR MEDICAL STUDENTS

A Source Book on the Development of Programmed Materials for
Use in a Clinical Discipline

PRESTON LEA WILDS, M.D. and VIRGINIA ZACHERT, Ph.D.

Title VII Project Number 1085
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The Medical College of Georgia
Augusta, Georgia

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January 1966

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FINAL REPORT

EFFECTIVENESS OF A PROGRAMMED TEXT IN TEACHING GYNECOLOGIC ONCOLOGY TO JUNIOR MEDICAL STUDENTS,

A Source Book on the Development of Programmed Materials for Use in a Clinical Discipline

Preston Lea Wilds, M.D. and Virginia Zachert, Ph.D.

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PREFACE

This report has been written with the intention of meeting the needs of persons who have differing interests in the project. For example:

1. Persons interested in the research results of a project evaluating new educational media in clinical medicine.
2. Persons interested in the problems involved in the development of programmed materials of sufficient quality for use in graduate level instruction.

Readers who are interested in this report primarily for its presentation of research results will find that most of the relevant information they seek is in the following odd-numbered chapters:

Chapter One. Statement of Problem.
Chapter Three. Experimental Design of the Project.
Chapter Five. Results.

A summary of these chapters may be found in the Abstract (page v). They contain most of the information which properly belongs in the final report of a research project. The other chapters and the appendices contain specific supporting data but also include much material which is related only indirectly to the research project.

Readers of this report who are interested in the development of programmed materials for use in teaching a clinical discipline to undergraduate medical students are advised to read the following even-numbered chapters:

Chapter Two. Catalog of Project Materials.
Chapter Four. Development of Programmed Teaching Materials.
Chapter Six. Interpretation of Data.

These chapters contain very little quantitative data which is not also presented in the odd-numbered chapters. Their main purpose is to present information, interpretation, and at times, unsubstantiated opinion of a kind which is usually excluded from a research report. They document the history of errors, misconceptions, false starts, and small successes in attempting to develop and evaluate programmed materials to teach an uncharted clinical discipline. If parts of these chapters seem more appropriate to a confession than to a research report, the authors can only express their belief that other workers in this field will find that the problems which these chapters raise are equal in value to the partial solutions which the other chapters present.

The authors hope that those few persevering persons who are interested in both the research results of the project and in the development of the materials which produced these results will recognize that some repetition in each chapter was necessary to provide continuity for the readers who use this text as a source book, rather than as a work to be read as a whole.

Finally, for all readers, there is the last chapter:

Chapter Seven. Principal Contributions of the Project.

This is an attempt to summarize the research and the non-research findings of the preceding six chapters. It has the virtue of brevity.

PLW
VZ

Augusta, Georgia
January 1966

ABSTRACT

PURPOSE. In 1963 the Medical College of Georgia, under a grant from the U. S. Office of Education, undertook a study to determine whether programmed instruction could be used to improve the teaching of the management of patients with gynecologic neoplasms to junior medical students. Instruction in this clinical discipline was assumed to have a dual nature:

1. The teaching of a body of knowledge or "content," much of which is controversial or subject to rapid change.
2. The teaching of the "application" of this body of knowledge to continually changing new contexts (patients with individual problems).

MATERIALS. Two programmed texts were prepared:

1. "Content" Text. An 830-frame linearly programmed text designed to replace conventional classroom teaching of gynecologic oncology.
2. "Application" Text. A 713-frame branching text consisting of 35 case presentations of patients with representative pelvic tumors and related conditions. The programming style used complex branches and loops, coded information-gathering frames, and remedial referrals to the "content" text in an attempt to simulate on paper the critical decision-making processes involved in working up and caring for real patients.

CRITERION MEASURES. Four special National Board Examinations in OB-GYN Neoplasms were prepared independently for this project. The National Board Part II, Comprehensive Examinations in Obstetrics and Gynecology of previous years were also used.

Measures of the learning of "application" (patient management) were oral examinations conducted by a panel of visiting judges from neighboring medical schools, combined with special tab-item tests designed to measure specific skills in diagnosis and management of patients with gynecologic neoplasms.

STUDY SAMPLES. The junior classes (96 students each) in the School of Medicine in two consecutive years were each divided into matched control and experimental groups.

In the second year of the project, cross-validation studies in five other medical schools were conducted using similarly selected groups in controlled, balanced studies.

EXPERIMENTAL PLAN. At the Medical College of Georgia in 1963-64, and at five other medical schools in 1964-65, experimental students received the "content" programmed text as a substitute for the conventional classroom instruction given to the control groups.

At the Medical College of Georgia in 1964-65, control students received the "content" text and experimental students received both texts. No lectures were given.

RESULTS. "Content" Testing. The linear "content" text was found in all schools to be at least the equal of and usually significantly superior to conventional instruction in its effectiveness in teaching gynecologic oncology, as measured by the National Board special examinations. When students were re-tested after a one-year interval, no significant difference in retention was demonstrated.

"Application" Testing. Experimental students who received the "applications" text of case presentations plus the "content" text scored higher on the tab-item examinations designed to measure "application" than did control students who received the "content" text alone in (1) thoroughness in collecting diagnostic information, (2) selection of appropriate diagnostic and therapeutic procedures, and they also made higher scores for overall performance in the oral examinations. The significance level for these differences ranged from $<.1$ to $<.01$. Experimental and control students were not significantly different in their selection of useless or contraindicated diagnostic information.

Time to Criterion Records. The superior performance of experimental students was achieved without an increase in their study time over that of control groups, and with a saving of faculty time equivalent to the time spent in the preparation and presentation of the course's conventional instruction.

Attitudes Toward Texts. The reaction of nearly all students toward both texts was strongly positive.

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CHAPTER ONE

STATEMENT OF PROBLEM

I. Background

A. Clinical Clerkships. In the final two, or "clinical" years of medical school, the student is expected to develop judgment and skill in the management of patients and in the diagnosis and treatment of their diseases and problems. He does this by actively participating in the care of patients for whom his superiors (interns, residents, and staff physicians) are directly responsible. The student's commitment to patient care results in his absence from many of his scheduled classes and conferences. In the obstetrics and gynecologic clinical clerkship at the Medical College of Georgia, for example, the average student in his junior year misses nearly a third of his classes. This is probably of little consequence most of the time, for the student masters the subject matter of the classes at his own pace from such sources as standard textbooks, journal articles, and his colleagues' lecture notes. In learning the management of patients, however, students find these sources inadequate.

B. Decision-Making and Learning. Students learn from active participation in the decision-making process. From this standpoint, the important decisions for the student to make are those which, for good or ill, directly affect the welfare of the patient. He should be faced with the consequences of his decisions as they affect the patient. Under such conditions he tends to be motivated to learn from every available source, including the library, his colleagues, and his superiors in order to avoid making errors which might have an adverse effect upon his patient. For the protection of patients in teaching hospitals, decision-making of this sort is reserved for graduate physicians participating in internship and residency training programs of gradually increasing responsibility. The medical student obviously cannot be given responsibility for critical decisions which affect the patient's welfare, and is therefore exposed to the decision-making process and its consequences for the patient only as an observer. Understandably, the consequences to which he is exposed are apt to be the favorable ones rather than the unfavorable ones. Thus, the student's exposure to the critical processes of decision-making in patient management is limited both by his lack of active responsible participation and by his lack of exposure to the results of such participation (especially if unfavorable).

C. Traditional Approach. For the past half-century the traditional method of increasing the student's active participation in the decision-making processes of patient care has been by tutorial or "bedside" teaching, in which a few students participate actively in a question-and-answer coverage of a particular patient's problem or problems, led by an experienced clinical teacher. This requires an enormous outlay of faculty time. In the Medical College of Georgia, as in many other schools, the ratio of students to teaching faculty is so large that such teaching methods, although of recognized value to the student, are restricted to a small role in the coverage of the curriculum.

II. Specific Problems.

A. Type of Improvement. In 1963, the Medical College of Georgia, under a grant from the U. S. Office of Education, undertook a study to determine whether programmed instruction could be used to improve the teaching of patient management to students in their junior year of medical school. It was recognized that the improvement might take any of several forms.

1. Improved immediate achievement of learning by students.
2. Improved retention of learning by students.
3. Increased efficiency of learning, saving the students' time which could then be used elsewhere.
4. More efficient use of faculty time.

B. The Selection of Subject Matter. The subject matter selected for the project was gynecologic oncology: the detection, diagnosis, and treatment of benign and malignant tumors of the female genitalia. The subject matter seemed to be of appropriate length for a major research project. Conventional textbooks of gynecology, of the type recommended to medical students, use from 40,000 to 250,000 words in presenting this material. The subject matter represents less than 5% of what the student is expected to learn during his junior year at the Medical College of Georgia, and represents less than 1% of the requirements of the four-year curriculum. The complexity and variety of teaching and learning problems encountered in this relatively small subject matter area are representative of similar problems encountered in many other phases of medical teaching.

C. Definition of "Content" and "Application." The teaching of a clinical discipline in medical school was assumed to have a dual nature.

1. The teaching of a body of scientific knowledge, much of which is controversial or subject to rapid change.

2. The teaching of the "application" of this body of scientific knowledge of continually changing new contexts (patients with individual problems).

In this project the term "content" is used to mean the body of scientific knowledge considered from a standpoint similar to that of conventional classroom lectures or chapters in a conventional textbook. "Content," as the term is used, deals with the knowledge of normal and abnormal body functions and structure, diseases of various organs, incidence, etiology, pathology, clinical course, diagnosis, treatment, prognosis, and so forth. The kinds of knowledge implied by the word "content" lend themselves readily to measurement by conventional multiple-choice testing.

"Application," on the other hand, is a term which refers to the uses of "content" knowledge in the diagnosis and treatment of individual patients. It includes the processes of collecting appropriate information from the patient's history, from physical examination, from diagnostic tests and procedures done in their proper sequence, correlation of this information, the formulation of a working diagnosis, and the selection of appropriate plans for treatment or management. The knowledge and skills implied by the word "application" are inappropriately measured by conventional multiple-choice testing.

D. Development of Teaching Materials.

1. Peculiarities of subject matter. The application of programmed instruction to the clinical fields of medicine presented special problems. A successful program would have to take into account not only the wide differences of ability and preparation among different medical students, but also the peculiar difficulty that for many clinical problems there are several divergent answers, each of which if subjected to further exploration might be found acceptable. It seemed probable that straight linear programs of the type which had been used successfully for teaching basic sciences in the pre-clinical years of medical school would lack the flexibility needed for teaching decision making in areas of controversy of clinical medicine.

2. Choice of programming strategy. The first problem of this problem was to develop a strategy for the programming of clinical materials. Linear programming (although non-Skinnerian) appeared to have many applications to teaching the "content" of obstetrics and gynecology. It seemed poorly suited, however, to the requirement that the student be given practice in the art of applying his newly acquired scientific knowledge to individual problems of patient care. At the start of this project, it had not yet been determined what strategy or technique was best suited

to this teaching problem. It was anticipated that a "branching" format could be adapted to the presentation of clinical problems, and that the student could be presented with a problem case and be required by a series of choices and responses to diagnose and manage the patient's problem. The proficient student, whose responses demonstrated that he had mastered the problem, could be advanced to new and more challenging case presentations. Other students, whose responses had indicated a deficiency, could be directed to remedial material, at the completion of which they could return to the case presentation.

Since this branching approach was to be an experimental one, based on no models then available, and for which no quality controls had been established, it seemed prudent at the outset to use linear programming as much as possible in presenting remedial or "content" material. It was anticipated that the final programmed text would be a "composite" of branched and linear programming techniques, utilizing remedial loops and bypasses.

3. Special requirements of texts. It was recognized that if the programmed texts to be developed for this project were to be of maximum value to medical education, they would not only have to be efficient as instruments for self-instruction; they would also have to exhibit the following characteristics:

   a. Student acceptability. The target population of this project, junior medical students, are experts in learning from conventional educational media. They have proved that they can learn efficiently from teachers, lecturers, texts, articles, and audio-visual materials which are often extremely inefficient from the learner's standpoint. A programmed text, if it were to succeed with such a population, would have to gain voluntary acceptance from adults who have invested much time and effort in learning to make effective use of less efficient but more familiar educational media.

b. Interspecialty transferability. If a mixture of programming techniques were to be used in order to program subject matter which was not suitable for programming by any one method, principles and guidelines would have to be developed defining what types of subject matter should be programmed by which method. If programming of clinical material were to be of widespread value in clinical teaching, the principles and guidelines developed for this project would have to be communicable to teachers in medical specialties other than obstetrics and gynecology so that they might adapt the techniques of this project to their own specialty.

c. Applicability of method to non-medical fields. Many disciplines wholly unrelated in "content" to those of clinical medicine require the student to develop problem-solving skills and behavior patterns which are very similar to the ones needed to solve medical problems. Examples of such disciplines include various engineering fields, business administration, social work and counseling, equipment maintenance and trouble shooting, criminal investigation and intelligence work, and many others. It was recognized that in the development of techniques to meet the teaching needs of a medical specialty, there was an opportunity to explore and evaluate programming strategies which might be immediately applicable to the teaching needs of unrelated disciplines.

E. Development of Testing Procedures.

1. Controlled study. At the beginning of this project, the experimental plan called for the comparison in a controlled experiment of the efficiency of learning from specially prepared programmed texts with learning by "traditional" methods such as lectures, lecture notes, reading assignments in textbooks, and other conventional media. It was hoped that such a study would provide answers for the many clinical teachers who felt that programmed instruction was fine for teaching in other areas, but was simply not suited to their particular teaching goals.
2. Uncontrolled variables. It was recognized that this study could not be removed from its clinical setting without destroying its significance for clinical teachers, yet if the study were to be conducted in its naturalistic setting, one would have to accept the effects of multiple uncontrolled variables. Medical students in their clinical clerkships learn from many important sources in addition to the formal instruction of the planned curriculum. For example, they learn from patients, interns, residents, other students, nurses, casual conversations with doctors, etc. Some, but not all of these effects could be measured if not controlled.
3. Crude criterion measures. As the study progressed, it became apparent that the effect of uncontrolled variables on student performance was of less importance than the crudity of the criterion measures used to evaluate that performance. The accepted criterion measures for determining the individual competence (or incompetence) of students in clinical skills proved inadequate to measure the effects on student performance of different methods of teaching these skills. The development of special testing instruments to measure the effects of different methods of clinical teaching was undertaken as an important part of the project shortly before the completion of its first year.

III. Summary of Problem.

A. **Program Development**. To meet the objectives of the project, it was necessary

1. to develop an essentially linear program in gynecologic oncology covering "content,"
2. to develop a branching program based on a series of case presesentations giving the student an opportunity to practice decision making in managing patients with gynecologic tumors, and
3. to combine the above materials into a "composite" program utilizing case presentations, bypasses, and remedial loops to automate completely the classroom instruction of gynecologic tumors and their management.

B. **Evaluation**. To evaluate whether the objectives were met it was necessary

1. to compare the "content" program, the "composite" program, and conventional classroom instruction with regard to the following dependent variables:
    - a. immediate achievement of learning of "content,"
    - b. retention of learning of "content," and
    - c. "application" of content to new contexts, and
2. to provide in addition
    - a. study time records of all students participating in the project,
    - b. data on student attitudes towards the programmed materials, and
    - c. information on methods of preparing programmed materials in a medical school setting.

CHAPTER TWO

CATALOG OF PROJECT MATERIALS

I. Teaching Materials.

A. Teaching Materials Developed Specifically for the Project. For the project, two types of programmed texts were developed to teach medical students the detection, diagnosis and management of benign and malignant tumors of the female genitalia.

1. "Content" text. An 830-frame linear programmed text, covering the content of gynecologic oncology in traditional didactic sequence was developed. This text and the lectures which were given to control groups at the Medical College of Georgia presented essentially the same content. (See Appendix A for Sample Frames).
2. "Applications" text. A 713-frame text consisting of 35 case presentations of patients with representative types of pelvic tumors and related conditions was prepared. The programming style was eclectic. It made use of constructed responses, complex branches and loops, coded information-gathering frames, and remedial referrals to the "content" text. The text aimed to teach "applications" of gynecologic oncology to specific problems of patient care in a manner which simulated on paper the process of working up and caring for real patients. (See Appendix B for Sample Frames).
3. Lectures in Gynecologic Oncology. Eight lectures in gynecologic oncology, using visual aids to the maximum, were specially prepared to be of the highest quality possible. They were given by an experienced teacher* and were tape recorded. During the preparation of the teaching materials,

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*Doctor William S. Boyd, Associate Clinical Professor of Obstetrics and Gynecology at the Medical College of Georgia.

neither the lecturer nor the program writer had access to the examination questions of the National Board of Medical Examiners. No attempt was made to "teach the tests." The lecture program was used only during the first year of the project at the Medical College of Georgia.

B. Teaching Materials Developed for the Project but Excluded from Research Plan. "Programmed Instruction Methods for Obstetrics and Gynecology," a 108-page programmed text, was prepared for a post-graduate course of the American College of Obstetricians and Gynecologists. This text was designed to introduce clinical teachers of obstetrics and gynecology to methods of preparing objectives for and actually writing programmed case presentations of the type developed for the "applications" text.

II. Testing Materials.

A. Testing Materials Specially Prepared for the Project.

1. Special "content" tests. Two matched Examinations in OB-GYN Neoplasms of 108 questions each were prepared for the project independently by the National Board of Medical Examiners. The two examinations, A and B, comprised almost all questions in the National Board's pool of questions in gynecologic neoplasms. All questions had been used in previous examinations administered nationally to candidates for medical licensure; therefore, performance norms for each question had already been established. The two examinations prepared by the National Board for this project were carefully matched, category for category, to provide an equal coverage of the subject matter using questions of comparable difficulty so that performance scores on the two examinations were essentially interchangeable. Examinations A and B were used during the first year of the project. For the second year of the project, the National Board of Medical Examiners scrambled the order of the questions

in examinations A and B and named the new examinations C and D. The project thus had four interchangeable examinations for pre- and post-testing. A more detailed description of the construction and content of tests A and B is presented in Appendix C.

2. Structured interviews (oral examinations) to measure learning of "application." At the start of the project no written materials were available to the investigators to measure the "application" of "content" to the problems of patient care. In most medical schools, the traditional method to measure this skill has been by oral examinations. The project was fortunate to secure the services of two consultants* who were teachers of obstetrics and gynecology at neighboring medical schools and who agreed to serve as judges throughout the two years of the project. The purpose in having outside consultants perform this part of the evaluation was to avoid the bias inherent in having examinations done by the teachers (lecturers and/or programmers) of the subject matter under investigation or by teachers who were familiar with the capabilities of the individual students or with the method by which they had been instructed. The project would require the outside consultants to conduct nearly 200 examinations in the same subject matter. It was essential that the format of the oral examinations permit enough flexibility and variation to avoid the danger that the judges would rebel and quit the project because they became too bored to continue with a repetitive task. The format of the structured interviews is presented in Appendix D.

3. Clinical problem-solving tests.

   a. Unforeseen need. Written tests to measure "application" were not a part of the project in its original design. In early 1964, however, the developing of a branching programmed text to teach "application" forced the recognition that general proficiency in "application" called for proficiencies in a variety of distinct but interrelated skills. In the programmed text, these skills had to be identified and taught by special strategies and formats. An evaluation of the results of the first session of oral examinations in January 1964 made it apparent that such examinations were too imprecise to measure certain of the proficiencies in "application" which could be clearly identified and taught in the programmed text. In the summer of 1964 a set of clinical problem-solving examinations was developed to supplement the program of special oral examinations.

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*Doctor E. J. Dennis, Associate Professor of Obstetrics and Gynecology, Medical College of South Carolina, and Doctor Michael Newton, Professor and Chairman, Department of Obstetrics and Gynecology, University of Mississippi School of Medicine.

b. Format of tests. The tests make use of a new format that borrows freely from the techniques and principles of Van Valkenburg, Nooger and Neville, and those of Rimoldi and of McGuire. The student is given an opportunity to take a history, do all or part of a general physical examination and order diagnostic studies and procedures in whatever sequence he prefers. In most cases, he may collect and interpret data in nearly a hundred different categories. He is then asked to define the patient's problem in detail, specifying the patient's diagnosis, the extent of the disease, and the various complicating and subsidiary conditions. He is asked to select from as many as 50 possibilities a sequenced plan of treatment appropriate to the patient's problem as he has defined them.

c. Description of tests. The nine examinations developed in this format included two sets of matched pairs and one set of "triplets." In each matched examination the presenting problem was identical, but the ultimate diagnosis and treatment were different. It was anticipated that the matched examinations could be administered and scored interchangeably. A more detailed description of each of the nine tests and sample test A may be found in Appendix E.

d. Development of scoring system. Trial scoring systems for the tests were developed to measure the following interdependent skills:

   i. Diagnostic process (comprehensiveness and appropriateness of the diagnostic workup).

   ii. Diagnostic product (accuracy and completeness of defining the patient's diseases or problems).

   iii. Therapeutic product (appropriateness of treatment or disposition of patient).

   Four senior resident physicians in obstetrics and gynecology served as a criterion group and developed a tentative scoring system for the nine clinical problem-solving tests. Each physician working independently assigned each item or option to one of 20 previously defined categories. The categories were later given numerical weights.

   The following is a summary of the results of testing using this trial scoring system:

   i. Criterion group performance. Resident physicians in obstetrics and gynecology took divergent paths through the test, but achieved uniformly higher scores. Faculty members who took the tests took more divergent paths than the residents did in working through the tests and received divergent scores.

   ii. Junior student performance. The junior students at the beginning of their clinical training in obstetrics and gynecology received scores which average less than one-fifth of the scores made by the residents. At the end of their clinical clerkships, the junior students made scores which approximated the variable scores of the faculty.

Close study of the scoring system developed by the residents indicated that the residents had a much narrower view than did faculty members of what constituted appropriate patient care in each case. The scoring system severely penalized most deviations from their concepts of appropriate diagnosis and treatment of each case and did not distinguish between "non-standard" but appropriate therapy selected by some faculty members and non-standard inappropriate therapy selected by many students. Much of the scoring system had to be discarded, and the remaining parts were continually modified during the last year of the project.

B. Other Evaluative Instruments Prepared Specially for the Project.

1. Time to criterion records. Cards and record sheets were prepared to permit students to record as easily and as accurately as possible the time they spent studying gynecologic oncology. The forms were used by all students in control and experimental groups in all medical schools participating in the project (See Appendix F).
2. Attitude surveys. A 38-question attitude scale and questionnaire was developed for the project and was completed by all students to whom the programmed texts were distributed. Students were permitted to return the completed questionnaires anonymously if they wished. (See Appendix G).

C. Other Testing Materials Used by the Project.

1. National Board Part II. The examinations in Obstetrics and Gynecology of the National Board of Medical Examiners, Part II were given. This two hour, 150-question comprehensive examination in obstetrics and gynecology designed for administration to senior medical students who

are candidates for medical licensure, was administered to all junior medical students at the Medical College of Georgia at the end of their junior year and a year later to the same students at the end of their senior year.

2. National Board category scores. For the project, the National Board of Medical Examiners provided special data including categorical analyses by classes and by control and experimental groups.

D. Other Evaluative Data Used by the Project.

1. Previous academic records. At the Medical College of Georgia, and in other schools participating in the project, the weighted grade-point averages of all students participating in the project were made available to the Research Director to permit a control in the equality of all groups.

2. Medical College Admission Test scores. These scores were made available to the Research Director for further evaluation of the equality of the control and experimental groups.

CHAPTER THREE

EXPERIMENTAL DESIGN OF THE PROJECT

I. Study Samples.

A. First Year (1963-64).

1. Method of selection of groups. The study sample consisted of the 93 students in the junior class in the School of Medicine of the Medical College of Georgia. They were divided into experimental (46) and control (47) groups. This was done on a stratified random basis. The classes were first divided into three strata (upper third, middle third, lower third) based on performance in the first two years of medical school. The weighted grade-point averages of all courses taken during the first two years of medical school were used as the basis for division. Within each stratum, students were assigned on a random basis to experimental and control groups. After the division had been made on the basis of weighted grade-point averages, a further check on the equality of the groups was made by comparing their Medical College Admission Test scores.

2. Reason for stratification. The reason for the division of the class into strata was that the clinical years of medicine require different skills and aptitudes than do the pre-clinical years. From past experience, it had been shown that at the Medical College of Georgia superior students tend to maintain their position from the first two years to the last two years, as do the least productive students who remain in difficulty throughout all four years. In the middle third of the class, however, there is usually considerable change in student ranking from the pre-clinical to the clinical years.

3. Further division of study sample. The junior class, after being divided into equal control and experimental groups of 47 and 46 students respectively, was further divided into two control and two experimental groups. The four groups were scheduled to serve clinical clerkships in obstetrics and gynecology in successive quarters of nine weeks each. The control groups served in the first and fourth quarters and the experimental groups served in the second and third quarters, giving the project an ABB'A' format.

4. Bias of sample favoring controls. Although the assignment of students to the different groups was made in strict accordance with the above described stratified random process, it became necessary for reasons of personal hardship and administrative convenience to make certain adjustments and transfers. When a student was transferred from one group to another, it was almost always possible to replace him with a student from his same stratum (third) of the class. There was, however, one important exception. All students who were in actual or potential jeopardy at the end of the sophomore year were prohibited from serving their clerkship in obstetrics and gynecology in the fourth quarter of the junior year. The reasons for this were unrelated to the project (they were related to the early scheduling of elective courses) but the effect was to eliminate students of borderline academic status from the last control group of the year and distribute them (randomly) in the first control group and the two experimental groups. The result was a bias in the selection of the study sample favoring the controls.

B. Second Year (1964-65). A new junior class was divided into control and experimental groups of 45 and 47 students respectively, using the same procedures as were followed the previous year. Again, students of borderline status were not assigned to the fourth quarter and hence the bias favoring the last control group was continued in the second year.

C. Cross-Validation (1964-65). In the second year of the project, five schools in addition to the Medical College of Georgia participated in the project replicating in so far as local conditions would permit the study completed the previous year at the Medical College of Georgia. In each of these schools, students were divided into control and experimental groups using methods comparable to but not identical with those used at the Medical College of Georgia. In all schools the division was checked against the students' previous performance, based on weighted averages, and against Medical College Admission Test scores. Assignment of students to control and experimental groups was reported to be as nearly random as possible with every effort being made to ensure comparability of the groups, but undoubtedly, factors such as special administrative needs, illness or the special personal problems of some students, resulted in some distortion of the pattern. (See Table VII)

II. Treatments.

A. Medical College of Georgia, First Year (1963-64).

1. Control groups. Groups A and A', serving clerkships in obstetrics and gynecology in the first and last quarters of the academic year, were given eight weekly lectures in gynecologic oncology, all by an experienced lecturer* who had taught this subject for many years at the Medical College of Georgia. The lecturer was asked to cover the same material that was to be presented in the linear "content" programmed text. He was provided with an outline which specified the topics to be covered and the degree of detail for which the students would be held responsible. This same outline was followed in preparing the programmed text. The lecturer

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*Doctor William S. Boyd, Associate Clinical Professor of Obstetrics and Gynecology was given an unlimited budget to add to his already extensive collection of slides and other visual aids for use with his lectures. At his request, his lectures were tape recorded in order that a monograph could be prepared from them later. Every effort was made to insure that the lectures not only covered the assigned content but were of the highest quality and interest possible. In accordance with departmental policy, attendance at these lectures was not compulsory (students sometimes had conflicting responsiblities of higher priority in the operating room and in the delivery room), but a roll was taken at each class. Students were required to record the time they spent studying gynecologic oncology throughout the clerkship.

2. Experimental groups. Experimental groups B and B' participated in clerkships in obstetrics and gynecology in the second and third quarters. They received no lectures or formal classroom instruction in gynecologic oncology. Instead, at the end of the first week of the clerkship, each student was given the "content" programmed text and was asked to complete it and return it before the end of the eighth week of the clerkship. Students in the experimental groups, like those in the control groups, were encouraged to do as much outside reading in gynecologic oncology as they wished to, were encouraged to attend weekly pathology and cancer conferences, and as a normal part of their clerkship, were assigned patients, some of whom had gynecologic neoplasms. Experimental students were asked to keep a record of their time studying gynecologic oncology throughout the clerkship.
3. Comparability of programmed text and lectures. Prior to the project, an agreement was reached to insure that the content of the two methods of instruction would be as nearly alike as possible. Also, an agreement was reached defining the use of visual materials in teaching control and experimental groups. The texts of these agreements may be found in Appendix F.

5. Criterion measures, both groups. Students in both the experimental and control groups received one Special National Board Examination in OB-GYN Neoplasms at the beginning of each quarter, and another as a post-test at the end of each quarter; the National Board Comprehensive Examination in Obstetrics and Gynecology, Part II at the end of the academic year, another National Board Part II examination a year later at the end of the senior year, and oral examinations, as described below.

B. Medical College of Georgia, Second Year (1964-65). By the end of the first year of the project, it was clear that the linearly programmed "content" text was such a satisfactory replacement for the series of lectures that the lecture program could be discontinued, and in the second year of the project, the study could be devoted to comparing the effectiveness of two different forms of programmed texts. Furthermore, the results of using the programmed text to teach the "content" of gynecologic oncology of the Medical College of Georgia had been so satisfactory that cross-validation studies in other medical schools seemed warranted. Therefore, in the summer of 1964 the experimental plan for the school year of the project was modified as follows:

1. Control groups. Control groups, A and A', serving clinical clerkships in obstetrics and gynecology in the first and fourth quarters of the academic year 1964-65 received in all respects the same treatment that experimental groups had received the previous year. There were no formal classes in gynecologic oncology; they received the linearly programmed "content" texts at the time of the pre-tests at the beginning of the clerkship and were asked to return them at the time of the post-tests.
2. Experimental groups. Experimental groups, B and B', had their clinical clerkships in obstetrics and gynecology in the second and third quarters

of the academic year. They received at the time of the pre-tests, at the beginning of the clerkship, both the linearly programmed "content" text and the branching "applications" text of case presentations. These two texts, used together, formed the "composite" text specified in the original proposal. Students were asked to return the texts at the time of the post-tests.

3. Criterion measures, both groups. In all respects, the testing of control and experimental groups in the second year of the project was the same as that in the first year, except that all students received additional tab-item examinations in case-presentation formats. Three were given as pre-tests, and five were given as post-tests.

C. Other Schools (1964-65). In the academic year 1964-65 five medical schools participated in a replication of the study conducted at the Medical College of Georgia the previous year. In each school, the experimental plan was modified to meet the requirements of the school's established curriculum. In spite of modifications, however, the treatments in the different schools remained uniform in the following ways:

1. Control groups. In each school control groups received that school's standard method of instruction in gynecologic oncology. In the different schools, the standard method of instruction varied from a series of formal lectures in one school to distribution of a list of recommended reading with a total absence of classroom instruction in gynecologic oncology in another school. This is shown in Table I.
2. Experimental groups. In all schools, experimental groups were given the linearly programmed "content" text at the beginning of the period of instruction. The texts were collected at the end of the period of instruction and shipped to the Medical College of Georgia. In those

TABLE I

METHODS OF INSTRUCTION FOR FIVE SCHOOLS IN STUDY.

SCHOOL	CLASS OF STUDENTS	DURATION OF INSTRUCTIONAL PERIOD (weeks)	INSTRUCTION METHOD CONTROL GROUPS	INSTRUCTION METHOD EXPERIMENTAL GROUPS
California College of Medicine	Sophomores	Spring Quarter	8 lectures	Gynecologic oncology "content" text. No lectures. Question and answer sessions offered once a week. Student attendance = none.
University of Nebraska College of Medicine	Juniors	5 weeks	1-2 hours seminar tumor teaching on clerkship OB emphasis (The entire class attended 6 hours of lectures given once a year.)	Gynecologic oncology "content" text.
University of North Carolina School of Medicine	Seniors	9 weeks	OB-GYN seminars once a week. Reading list on Oncology	Gynecologic oncology "content" text. Seminars once a week - optional. Student attendance = none.
State University of Iowa School of Medicine	Juniors	4½ weeks	Joint conference Jr. & Sr. students. OB-GYN 1 hr. every 2 weeks. Teaching clinic 1 hr. each day attended by Jr. students and GYN residents conducted by Sr. Staff Member	Gynecologic oncology "content" text. No conferences or lectures.
University of Vermont College of Medicine	Juniors	12 weeks	5 -12 hours of lectures in Jr. yr. (Clerkship in Sr. yr.)	Gynecologic oncology "content" text. No lectures.

schools where control groups received formal classroom instruction in gynecologic oncology, the classes were omitted for the experimental groups.

3. Criterion measures, both groups. All students participating in the study were asked to keep a record of their time spent studying gynecologic oncology. All students in all groups were given as a pre-test one form of the Special National Board Examination in OB-GYN Neoplasms, and a second form of this examination as a post-test at the end of the period of instruction.

III. Collection of Data.

A. Summary of Evaluation Program.

1. Medical College of Georgia. Table II summarizes the evaluation program at the Medical College of Georgia for the two years. The number of students in each group and the order in which they took the special National Board "content" Examinations in OB-GYN Neoplasms are given. Study time data and oral examinations were required of all students. Attitude surveys, however, were required only of those using the programmed texts. The table shows the code numbers of the National Board of Medical Examiners, Part II, Comprehensive Examination in Obstetrics and Gynecology.
2. Other schools. Table III indicates the size of the groups at the other schools and the order of pre- and post-tests given. Requirements for time sheets and attitude surveys are also indicated.

B. Administration of Criterion Tests.

1. "Content" pre-tests. At the Medical College of Georgia in 1963-64 and 1964-65 and at the other five schools in 1964-65 a 90-minute, 108-question Special National Board Examination in OB-GYN Neoplasms prepared for the project by the National Board of Medical Examiners was administered during the first week of the instruction period to every control and experimental group. Of the pair of matched examinations prepared by the National Board of Medical Examiners, the test used as a pre-test for one group would be used as a post-test for the following group and vice versa. In the second year of the project, the original pair of examinations (A and B) were disguised with scrambled and renumbered questions and issued as examinations C and D.
2. Administration of "content" post-tests. The 90-minute, 108-question post-tests were administered to each experimental and control group

TABLE II

SUMMARY OF EVALUATION PROGRAM

Medical College of Georgia

SCHOOL	# STUDENTS	"CONTENT" * EXAMS		STUDY TIME	ATTITUDE SURVEYS	ORALS	COMPREHENSIVE FINAL EXAMINATIONS **	RETENTION TESTING **
		Pre-Test	Post-Test					
Medical College of Georgia 1963-64								
Control I	23	A	B	X	---	X	May 1964 NBME - LMB	May 1965 NBME - 0420S
Experimental II	22	B	A	X	X	X	NBME - LMB	NBME - 0420S
Experimental III	24	A	B	X	X	X	NBME - LMB	NBME - 0420S
Control IV	22	B	A	X	---	X	NBME - LMB	NBME - 0420S
Medical College of Georgia 1964-65								
Control I	24	A	B	X	X	X	May 1965 NBME - 0420S	
Experimental II	21	B	C	X	X	X	NBME - 0420S	Scheduled for
Experimental III	24	C	D	X	X	X	NBME - 0420S	May 1966
Control IV	23	D	C	X	X	X	NBME - 0420S	

*National Board Special Examination in OB-GYN Neoplasms.

**National Board, Part II, Comprehensive Examination in Obstetrics and Gynecology

TABLE III

SUMMARY OF EVALUATION PROGRAM

Five Schools in Study

SCHOOL	# STUDENTS	"CONTENT" * EXAMS		STUDY TIME	ATTITUDE SURVEYS
		Pre-Test	Post-Test		
California College of Medicine (divided class simultaneous treatment)					
Ia Control	45	C	D	X	---
Ib Experimental	47	C	D	X	X
University of Iowa School of Medicine					
I Control	10	A	B	X	---
II Experimental	9	B	A	X	X
III Experimental	13	B	A	X	X
IV Control	10	A	B	X	---
V Control	11	A	B	X	---
VI Experimental	13	D	C	X	X
VII Control	11	C	D	X	---
VIII Experimental	11	D	C	X	X
University of Nebraska College of Medicine					
I Control	10	A	B	X	---
II Experimental	11	B	A	X	X
III Control	9	A	B	X	---
IV Experimental	10	B	A	X	X
V Control	9	A	B	X	---
VI Experimental	11	D	C	X	X
VII Control	10	C	D	X	---
VIII Experimental	10	D	C	X	X
University of North Carolina School of Medicine					
I Experimental	14	A	B	Books lost	No forms
II Control	14	B	B	X	---
III Experimental	16	Did not take tests		X	X
University of Vermont College of Medicine					
I Control	14	A	B	X	---
II Experimental	16	B	C	X	X
IIIa Control } split	8	C	D	X	---
IIIb Experimental }	7	C	D	X	X

*National Board Special Examination in OB-GYN Neoplasms.

as close to the end of the clinical clerkship or period of instruction as other commitments would permit. At the Medical College of Georgia, the examination was administered in the eighth week of the clerkship in 1963-64 and in the sixth week of each clerkship in 1964-65. In other medical schools in 1964-65, the examination was usually administered in the last week of the period of instruction.

3. Administration of oral examinations.

   a. Instructions. In 1963-64 and 1964-65, at the Medical College of Georgia only, structured interviews were conducted by a panel of two visiting judges at the end of the second quarter and at the end of the fourth quarter of each academic year. During each week-long examining session, the judges conducted interviews with all students from both experimental and control groups of the current and the preceding academic quarter. Prior to the start of each examining session, the judges were oriented verbally and by written instructions as to the purpose of the examinations and the procedure to be followed. (See Appendix D)

   b. Deviations from instructions. The procedure the judges actually followed during the four examining sessions in the two years of the project differed from the "instructions" in the following ways:

      i. The interval between students was set at 30 minutes and duration of the interview was standardized at 25 minutes.

      ii. The judges in presenting cases to the students made frequent use of colored slides depicting patients and/or pathological specimens.

      iii. Tape recordings of interviews were made and discussions were held with the judges to encourage them to adhere to the specified purpose and format of this type of interview.

iv. The judges found that in reaching their final pooled grade "by consensus," it was impossible for them to distinguish between "application" and "content." Therefore, the final grade was recognized as representing both aspects of the student's performance rather than "application" alone.

c. Limited to local study. For obvious reasons, the program of oral examinations took place only at the Medical College of Georgia and was not replicated in the second year of the project in the other medical schools participating in the study.

4. Administration of "retention" post-tests.

a. Administration. The instrument for this evaluation was the comprehensive Examination in Obstetrics and Gynecology, Part II of the National Board of Medical Examiners. The test, in various forms, was administered to an entire class of the Medical College of Georgia at the end of May, after the conclusion of the last quarter of the academic year. The following classes took the test:

i. May 1963, the Junior Class.
ii. May 1964, the Junior Class, and the Senior Class.
iii. May 1965, the Junior Class and the Senior Class.

Each test consisted of about 150 multiple-choice questions on the "content" of obstetrics and gynecology in various categories:

1. Embryology, Anatomy and Physiology of the Female Organs of Reproduction.
2. Physiology and Ecology of Woman
3. Normal Pregnancy: Physiology, Biochemistry, and Psychology, Diagnosis, Management.
4. Physiology and Conduct of Normal Labor and Parturition; the Newborn.
5. The Puerperium; Normal and Abnormal
6. Complications of Pregnancy
7. Complications of Labor and Delivery
8. Disturbances of Function
9. Anatomic Pelvic Disorders
10. Infections
11. Neoplasms

b. Special data provided. The eleventh category, Neoplasms, consisted of about 35 multiple-choice questions. For each class and for each control and experimental group participating in the project, the National Board of Medical Examiners provided the project with an item analysis of the performance of each group or class in each category.

c. Measurement of retention. Retention of learning of content was measured by repeating the administration of the test (in a different form) to control and experimental groups a year after their completion of the teaching program in obstetrics and gynecology, just before their graduation from medical school at the end of the senior year. The change in score in Category 11, Gynecologic Neoplasms, during the one-year interval was used to measure retention.

d. Deviation from norms. The fact that the mean scores of students at the Medical College of Georgia were below the national mean scores in nearly every category should not be interpreted as a reflection of the achievement of learning obstetrics and gynecology at the Medical College of Georgia in comparison with the national average. First, the students in the project were juniors and took the test as part of a course requirement. The national averages were compiled from the scores of senior students who took the test as candidates for medical licensure. The senior students in the project who took the test did so neither as candidates for licensure nor to satisfy course requirements. The test was administered to seniors as part of the research project. Hence, the students had little incentive either to study for the test or to make an extra effort during the test to make a high score.

5. Measurement of "application" by written tests (Medical College of Georgia, 1964-65).

   a. Pre-tests. Each control and experimental group received, in addition to the "content" pre-test, an "application" pre-test which consisted of three "clinical problem-solving (or tab-item) tests," each of which required about a half-hour for the student to complete. The purpose of administering these examinations as pre-tests was chiefly to familiarize students with the new and radically different format. There was little expectation that the tests would serve as quantitative measures of the students' entering repertory of clinical problem-solving skills.

   b. Post-tests. Each control and experimental group was administered at about the time of "content" post-test an "applications" post-test consisting of five tab-item tests. Students were given three hours to complete the five tests.

   c. Test schedule. Clinical problem-solving tests were administered to students of the junior class in accordance with Table IV. The tests identified on the table only by their letter designations are described in greater detail in Appendix E, which also includes sample Test "A".

   d. Changes in tests. During the academic year 1964-65, parts of the nine tests underwent modification after each use. The correction of many defects in the content and format of parts of the tests made them function more efficiently, but invalidated comparative scoring of parts of the tests which were revised between administrations. At the end of the year, only those parts of the tests which remained unchanged from one administration to the next were considered suitable for evaluation of student performance in specific problem-solving skills.

TABLE IV

TESTING SCHEDULE FOR CLINICAL PROBLEM-SOLVING (TAB-ITEM) TESTS ADMINISTERED TO THE JUNIOR CLASS OF THE MEDICAL COLLEGE OF GEORGIA 1964-65

GROUP	PRE-TESTS	POST-TESTS
1st Control Group	A (+B) + D'	A' + B + C + D + E
1st Experimental Group	A' + D' + E'	A + B + C + D + E
2nd Experimental Group	A + D' + E'	$\underline{A}$ + B + C + D + E
2nd Control Group	A' + D' + E'	A + B + C + D + E

C. Time to Criterion Records. Prior to the start of the project, the methods used to record the student study time in this project were specified. The text of the original memorandum on time to criterion records and a sample time sheet may be found in Appendix F.

D. Attitude Surveys. Students in all phases of the project who received programmed texts for study were required to turn in a complete attitude survey at the end of the course. They were permitted and were encouraged to fill out the questionnaire anonymously and turn it in unsigned. (See Appendix G for a copy of the Survey).

CHAPTER FOUR

DEVELOPMENT OF PROGRAMMED TEACHING MATERIALS

I. Work Accomplished Prior to Start of Project.

A. Research Plan. In the year preceding the start of this project, the research plan was developed in detail. The purpose of the project, to evaluate programmed instruction as a means of teaching gynecologic oncology to junior medical students, was decided upon. An acceptable experimental design was prepared. A testing program was established using wherever possible existing materials and standard methods. The crucial items in the research plan which were not available to the project were the programmed texts.

B. Quality Materials Needed. It was obvious that if the research part of this project was to be of any value, the programmed teaching materials to be evaluated would have to be of the highest quality possible. No useful purpose would be served by setting up an expensive, controlled, balanced study only to demonstrate that the best possible clinical teaching by conventional methods is superior to hastily contrived, improperly revised, and inadequately validated programmed materials. Furthermore, an essential part of the research project was to develop methods to permit subject-matter experts in medical schools to prepare, revise, and validate programmed materials in their specialties with assurance that their completed program in its final form would be of satisfactory quality.

C. Literature Search. Prior to the start of the project, the literature was reviewed on the following areas:

1. Response mode (multiple-choice versus constructed response),
2. Step size (small steps versus large steps),
3. Density (ratio of new responses to total responses),
4. Presentation mode (teaching machine versus programmed text),
5. Page format (horizontal versus vertical), and
6. Programming strategy (linear versus branching versus composite).

This review led to the conclusion that each of these was a complex problem for which there was at the time no categorical answer which could be relied upon for clinical teaching in medical schools. The original grant proposal presented the problem this way:

> "The most difficult variable to control and evaluate in interpreting results of programmed instruction research is the quality of the program. This seems to be an inherent problem. The effectiveness of an experimental programming technique will vary with the quality of the programming. By the time one has established objective criteria for quality control of the program, one has usually also answered some of the problems of the effectiveness of the programming techniques."

D. Original Working Principles. The working principles for the development of programmed texts in this project were based largely on the experience of others (see Bibliography). The working rules were originally only 6.

1. Use programmed text rather than teaching machine presentation.
2. Use dense linear programs to present both new and remedial material.
3. Use branching format primarily to diagnose the student's deficiencies.
4. Use clinical applications to help motivate the student.
5. Use constructed response whenever a complex verbal or diagrammatic response is required.
6. Restrict multiple-choice answers to situations where the student has indeed a choice to make.

Two additional principles were added after tryouts of the first drafts of portions of the linear text:

7. Use thematic rather than formal prompting.
8. Avoid typographical cueing.

II. Controls of Course Content.

Before any of the teaching materials were developed for the project, two methods were developed to limit or define the course content to be covered in the programmed text and in the special lectures prepared for control groups.

A. Agreement on Course Requirements.

1. "Requirements of course." As a guide for both the lecturer and the program writers, a 2500 word outline of the "Requirements of Course" was prepared (See Appendix H). This outline attempted to define the verbal knowledge and skills in gynecologic oncology which a medical student was expected to be able to demonstrate at the end of the "course of study." The "course of study" was assumed to include, in addition to didactic instruction and outside reading, appropriate clinical experience in the care of patients. The "Requirements" represented the skill and knowledge in gynecologic oncology which the student was expected to acquire as a result of his total experience in the clinical clerkship, rather than as a result of his learning from a specified instructional method.
2. Selection of topics. Preparation of the outline took place over a six months' period prior to the start of the project. Many drafts of the outline were reviewed and revised by different faculty members of the Department of Obstetrics and Gynecology of the Medical College of Georgia. Controversial items which were rejected by some faculty members and recommended by others were retained in the outline.
3. Effort at behavioral terms. Although much effort was expended in trying to define the requirements of the course in behavioral terms, the final product seemed to represent a consensus of the teaching aims of departmental faculty members, without regard to the restrictions imposed by

time, by the limited availability of facilities and patients, and by the personal limitations of students and faculty members. Thus, the outline was not so much a set of behavioral objectives for the programmed text as it was a guide to students of the knowledge and skills which faculty members in the Department of Obstetrics and Gynecology expected them to have achieved at the conclusion of the course of study. Although the language of the "Requirements of Course" expressed the course objectives in terms which were often non-behavioral, the outline nevertheless served as a useful and meaningful guide to both the lecturer and the program writer in preparing their teaching materials.

B. Agreement on Degree of Detail. The writers of the programmed text and the lecturer agreed to use the "Requirements of Course" as the specific outline of diseases and disorders which would be presented in the two teaching methods. They also agreed on the degree of detail they would present in accordance with the principles set forth in the experimental design of the project (See Appendix F).

III. Development of the "Content" Text.

A. Description of Text. The "content" text in its final form is a non-Skinnerian linear text of 830 frames with 45 illustrations or diagrams. Nearly all frames require several constructed responses. The text is presented in a horizontal format with two frames to the page. Unconventional features of the text result from the assumptions which were made.

B. Assumptions of the Program Writer.

1. Use. The program would be adjunctive rather than inclusive in its coverage of content. It would be written with the admittedly erroneous assumption that the student entering his junior year of medical school

had available for instant recall, without special prompting, all his knowledge of gross and microscopic anatomy, general and systemic pathology, physical diagnosis, pertinent aspects of biochemistry, endocrinology, radiobiology and related basic medical sciences as they apply to the study of gynecologic tumors. It was recognized that gynecologic oncology is largely a series of special applications of knowledge to which the medical student has had some exposure in his freshman and sophomore courses. Therefore, most of the programmed text would be made up of frames requiring the student to make new applications of old (and largely forgotten) knowledge. In the programmed text, the basic science information which the student was assumed to have learned previously would be presented to him to be re-learned only after he had demonstrated to himself that on his own, he was unable to supply this information in its specific application to the problem under consideration.

2. Density. Repetition would be scanty and widely spaced and would be introduced into the text only in response to repeated demands by students.
3. Prompts. The single-concept frame would be used sparingly. Many frames would present multiple blanks and multiple interrelated ideas simultaneously. This would permit greater use of thematic rather than formal prompting, and would further reduce the need for repetition.
4. Difficulty. In presenting new and unfamiliar material to the students, the program would demand that the student use intuition as well as ingenuity in guessing what the next step might be. Whenever possible, the student would be asked to write out a new word and use it correctly or express a new concept before, rather than after, it was presented to him for the first time in print.
5. Length. The programmed text would be shorter and more concise than conventional prose treatments of the same subject matter in ordinary textbooks.

C. Student Acceptability. It was essential to the success of this project that the programmed text in the final form be favorably received by the students.

1. Challenging. It would have to incur the student's respect. It was assumed that this could be accomplished by maintaining an element of intellectual challenge.

2. Efficient. It would have to *appear* to be a short-cut to efficient learning. It was assumed that this could be accomplished by keeping the text as short as possible. Brevity could be achieved by strict adherence to the "Requirements of Course" and by eliminating from the text the re-teaching of basic science information which the student might have already mastered.

D. First Draft of "Content" Text.

1. Description. The programmed text as it was originally drafted resembled an examination of nearly a thousand questions calling for nearly all the information specified in the "Requirements of the Course." The questions required written answers. There was no repetition except for occasional summary or terminal frames. There were no illustrations and very few prompts or cues. It was obvious that the text was less than perfect as an effective and acceptable teaching instrument for medical students.

2. The defects had a virtue. The programmed text in its first draft was too short, too demanding, and too complex for a student who was not already a master of the subject matter. The errors and excesses of the program in its first draft, however, were all in the same direction. They could be detected and overcome in the process of revision. It was expected that trial students working through the program would protest against the excessive and unreasonable demands made of them and would be able to suggest specific remedies on a frame-by-frame basis. The

writer recognized that excesses and errors in the other direction, making the program too long, too simple, too boring and repetitious, would be far more difficult to correct during the process of revision. Trial students faced with such a program might express generally negative reactions to the text but would be unlikely to make specific, frame-by-frame suggestions to correct these errors and excesses. The program writer, by ignoring the needs of students for prompts, cues, and repetition, was able to put the entire text on paper in a short time and limited his responsibility to specifying what the text was supposed to teach. His predictions and assumptions of what a junior medical student knew or did not know, or of what he found difficult and what he found easy were too unreliable to be of value in making the first draft of the program. The result was a very difficult text which, in ways the writer could not predict, required extensive revision by "expert consultants."

IV. Revision of "Content" Text.

A. Consultants Employed. In the revision of this program, the "expert learning consultants" were a carefully selected group of senior and sophomore medical students. Also, certain faculty members volunteered to work their way through parts of the text in a specified order. The student consultants received a small hourly remuneration for their work.

B. Procedure for Making Revisions. When a consultant completed a section of the text, all frames in this section requiring revision were rewritten and retyped before the text was presented to the next consultant, who thus saw only fresh unmarked copy. Some frames were replaced as many as five times. When the final program was duplicated for operational use in the project, scarcely a frame was left from the original draft of the program.

C. Description of Consultants. The following consultants were used:

1. Senior student. An exceptionally able and mature senior medical student who was already familiar with the subject matter was first. This student pointed out the most glaring errors, non sequiturs, and unreasonable obstacles in the program. His corrections made the text smooth enough for review by a subject-matter expert.
2. Faculty member. Fellow faculty members who were experts in the subject matter followed. Different faculty members reviewed different sections, reviewing subjects of their special interest or competence. The purpose of this revision was to detect errors and deficiencies in the content. The suggestions of these subject-matter experts with regard to format or programming technique were courteously received but were seldom incorporated into the revised text.
3. Sophomore student. An exceptionally able student who was unfamiliar with the subject matter but had an excellent academic record and good background preparation came next. This student by suggesting revisions, repetitions, additional cues, illustrations, summary frames, and changes in the format provided information which permitted the program to function rather well as a self-instructional text for other well-prepared and well-motivated students.
4. Sophomore student. After this came a student of less than average ability who was unfamiliar with the subject matter and whose preparation for it was at best uneven, but who was conscientious and well-motivated. The revisions suggested by this student included additional repetition, additional cues, and more illustrations, and other specific changes. The effect of his suggested revisions was to render the text usable by the least prepared students in the class.

5. __Senior student__. The final consultant was a senior student whose familiarity with the subject had long since evaporated and whose interests lay in other areas. This disinterested, poorly motivated student tended to skip material which bored him and to dodge the challenge of material which he considered unnecessarily difficult. This student was contemptuous of the subject matter and of the method of presenting it. He made an effort to find something to criticize on every page. The end result was a far more polished program than it would have been otherwise.

D. __Effect of Consultants on Text__.

1. __They made the text effective__. The criticisms of the first three consultants permitted revisions of the text which changed it from an ineffective teaching instrument into an effective, if somewhat rough, programmed text. It is doubtful whether the further revisions improved the __effectiveness__ of the text as a teaching instrument.
2. __They made the text acceptable.__ The criticisms of the last two consultants were of value chiefly in improving the __acceptability__ of the text to medical students. In particular, the text was made more acceptable for ill-prepared and poorly motivated students in the class. It is probable that some of the suggestions of the last two consultants for additional repetition and more explicit prompts tended to blunt the intellectual challenge of parts of the text and perhaps made the text less acceptable to the academic leaders of the class. Such an effect should be considered unfortunate; the leaders, of all students in the class, were perhaps least in need of programmed instruction to help them learn; nevertheless, their position as leaders made it important that the text receive their endorsement as well.

E. The Intermediary. In the revision of the programmed text, great care was taken to insure that the consultants did not express their criticisms directly to the program writer. Instead, the criticisms were either expressed in writing or were expressed verbally to a third person who wrote them down. It was essential that the third person be one to whom the students could talk freely, revealing both their own ignorance and the inadequacies of the programmed text as a teaching device. The interposition of an intermediary between the student consultants and the program writer facilitated the process of revision in two ways.

1. Student freedom. The student consultants were protected from being judged by the program writer (one of their teachers). They were encouraged, by a person who knew less of the subject matter than they, to express their criticisms with as much hostility and frankness as possible. Without this protected, permissive situation many students would not express themselves freely. The result was a wealth of critical comments which might not have been otherwise expressed.
2. Writer restrictions. The program writer was permitted to teach only by means of his paper program. Whatever the reaction of the students, he had no opportunity in person to clarify misunderstandings or to justify his work. Only by changing the program until the students' responses to it were satisfactory could he function effectively as a teacher.

F. Use of Student and Faculty Time. The preparation of the "content" text in gynecologic oncology for use at the Medical College of Georgia in the academic year 1963-64 was accomplished in three months (June, August, and September 1963). No exact record of time expenditures was kept for any personnel participating in the production except the students (who were paid on an hourly basis). Nevertheless, the following estimates may be of value:

1. Program writer - about 90 hours (based on three afternoons a week over a three-month period).
2. Other subject-matter experts (4) - two hours each.
3. Student consultants (equivalent to 4) - 25 hours each.
4. Intermediary - 50 hours.
5. Medical illustrator - 25 hours.

The above figures do not include time spent preparing the "Requirements of the Course" or supervising the process of duplicating the finished text.

G. Revision of "Content" Text after Field Testing. In the spring of 1964 a tally was made of all responses in 18 randomly selected programmed texts which had been completed by students in the experimental groups of the project during the year. It was hoped that such a tally would be helpful in providing guidelines to permit revision to be made on an objective basis. These expectations were not fulfilled.

1. Determination of error rate.
   a. Method. From a randomly selected sample of 25 consecutive frames (numbers 76 to 100) an error rate was determined by dividing the number of possible errors that could have been made in the 25 frames by the number that actually were made. The figure for the 25 frames was 7%. The frame-by-frame error rate, however, ranged from 0% to 28%. (See Table V).
   b. Interpretation. A careful study of the response in this sample sequence of 25 frames was compared with responses to summary or terminal frames further on in the text. It became apparent that the effectiveness of a frame as a teaching device was not correlated with a low error rate. In fact, it could be demonstrated by the high incidence of correct responses later in the text that some of the most effective teaching frames in the

TABLE V

SUMMARY OF ERROR RATES

Tallies of answers from 18 junior
medical students on Frames 76-100

FRAME	BLANKS	ERRORS	POSSIBLE ERRORS	ERROR RATE
76	2	0	36	0
77	2	10	36	.28
78	5	5	90	.06
79	1	5	18	.28
80	3	5	54	.09
81	2	10	36	.28
82	1	0	18	0
83	3	11	54	.20
84	4	2	72	.03
85	2	2	36	.06
86	1	0	18	0
87	X	X	X	X
88	1+	0	18+	0
89	2	2	36	.06
90	3	0	54	0
91	3	0	54	0
92	1+	0	18+	0
93	1	1	18	.06
94	1	0	18	0
95	2	0	36	0
96	2	7	36	.19
97	1	1	18	.06
98	2	0	36	0
99	2	0	36	0
100	2	2	36	.06
TOTALS	49	63	882	.07

NOTE: 1+ means "answer in your own words."

sequence were those with very high error rates. On the other hand, it was also apparent that some of the frames which elicited error-free responses from all students were also highly effective as teaching frames and could not be eliminated on the grounds of redundancy.

c. Validity. The problem of calculating the error rate in a programmed text which does not insist upon a precise vocabulary but requires the student to find his own words is in itself a problem which renders the calculation of error rates almost as meaningless as their interpretation. The responses to Frame 293 illustrate the problem and are shown in Table VI.

2. Frames revised. Although the students' error rates proved of little value in detecting the frames requiring revision, their responses and sometimes their marginal remarks were most helpful. Most of the frames requiring revision were in one or more of the following categories.

a. Frames using typographical cueing.

b. Frames with ambiguous instructions which left the student uncertain of the type of response he was expected to make.

c. Frames containing factual or "content" errors.

d. Frames containing overly dogmatic statements requiring qualifying words and phrases.

The first year's revisions were made with the intent of making the text more acceptable to casual inspection by subject-matter experts (faculty members) than of making it more effective as a teaching instrument for students. In all, about 25% of the frames received some modification, ranging from complete rewriting to minor typographical corrections.

TABLE VI

LISTING OF RESPONSES TO OPEN-END FRAME

Examples of answers given by 18 students
chosen at random to Frame 293

Frame 293 - Question: In Stage I cancer, the "cancer is strictly confined to the cervix." Why, then, doesn't a simple total hysterectomy result in 100% cures? (Your Words)

Recommended Response (concealed): (in effect)
THE STAGING IS BASED ON CLINICAL EXAMINATION ALONE. The clinical examination is frequently erroneous as an estimate of the true extent of the disease. Actually, about 20% of Stage I cases have spread beyond the cervix, but this is not detectable by pelvic examination.

Student Responses:

1. Because distant metastases via lymphatics is possible; the staging is by clinical evaluation alone and does not rule metastasis out.
2. Clinical exam not 100% correct and many Stage II ca's are dx. as Stage I.
*3. Ca. is multicentric in origin and other sites are present though not clinically detectable.
4. Due to error of dx. of the stage.
*5. Every woman does not get yearly Pap smears.
6. Because of contamination during removal.
7. Not really Stage I - some extension or metastasis has occurred.
8. Inadequate excision.
9. Staging is based on clinical evidence, actual extent of disease may be greater.
10. Invasion of lymphatics can occur with distant metastases early in the course of Stage I.
11. (a). The diagnosis was wrong - the Ca. had invaded parametria, etc.
    (b). The highly malignant epithelium developed another center of Ca. (vaginal, etc.)
12. Clinical diagnosis, not pathologic.
13. Missed evaluation of stage - multiple areas of pre-malignancy - malignant potential.
14. Inadequate Dx.
15. Spread may be more extensive than that seen only by early clinical exam.
16. Can't be that definite in statement like included in quotation.
17. Because staging based on clinical impression and this may differ from actual involvement.
18. This is a clinical impression and may not be pathologically true.

*considered inadequate answer.

H. Revision of "Content" Text at end of Second Year of Field Testing. In the summer of 1965, after the text had been used by several hundred medical students in six different medical schools, tallies were made of all responses from 25 texts including samples from all schools participating in the study. Forty frames and three illustrations were identified as containing errors which required revision. The errors in the 40 frames were classified as follows:

1. Typographical errors, 8
2. Errors of fact or substance, 30
3. Errors in programming technique, 2.

In this final revision, changes were made in less than 5% of the frames. In this stage of the program development, evaluation of student responses was of negligible value in identifying frames needing modifications.

V. Development of "Applications" Text.

In January 1964, work was started on the second phase of the project, the development of a patient-oriented programmed text designed specifically to help the student develop skills of clinical problem solving for patient care. This type of programming presented considerable theoretical and technical difficulties.

A. General Aspects of Clinical Problem Solving. Clinical problem solving is an extremely complex process. It involves not only numerous interactions between the physician and his patient, but also interactions between the physician and many different laboratory services and their personnel. Often the process for just one patient extends over many days and involves multiple exchanges of complicated information before a resolution of the problem can be achieved. To try to reduce this complex and variable process to a schematic form which can be presented in its entirety on a few sheets of paper is certain to result in over-simplification. Nevertheless, it seemed probable that the distortions and omissions of presenting clinical problem solving through the medium of programmed instruction would at least be different from and perhaps of lesser magnitude than the distortions and omissions of presenting the process through more conventional educational media. It was recognized that programmed instruction could provide a close parallel to the actual process of clinical problem solving in some of the following ways:

1. The student could be required to begin by gathering information about the patient. The more information he gathered, the more selective he would have to become in the acquisition of further information. Also, he would have to call upon his fund of specialized medical knowledge and apply it to the patient's problem.
2. The student could be required to decide when he had enough information to proceed with the management of the patient. The answer to the question "How much information is enough?", obviously would vary with the circumstances. At one extreme, there are clinical problems where the entire process is one of gathering information and correlating it. Once the diagnosis is established and the patient's problem or problems are defined, further treatment may be unnecessary. At the other extreme, there are emergency situations, cardiac arrest, for example, in which only the briefest information gathering is possible before active therapy must be started. Thereafter, obtaining further information, evaluating it, and modifying the plan of treatment must be carried forward simultaneously.
3. The student could be required to formulate a sequenced plan of therapy, and to modify this plan in accordance with changes in the patient's status.

B. Computer Based Programming. At the outset, it was recognized that if programmed materials were to represent problems of patient management realistically, the medium of presentation must not only permit the accumulation of detailed information in an orderly fashion, but must also permit bypassing of information-gathering whenever necessary. It was apparent that a computer would be most useful in providing storage capacity and random and controlled access to clinical information. It was recognized, however, that even a computer must be programmed, and to program a computer with a clinical problem, a clinician must do the programming. It was further recognized that a computer-based program would first have to be prepared on paper. It was decided that the project would restrict itself to this first stage, that the case presentations developed for the project would not reach a degree of complexity and sophistication requiring the flexibility and storage capacity of the computer. The principles underlying the presentation of clinical cases in a paper program, however, can also be used as a guide for the future development of computer-based programs.

C. Development of A Model Case. In the initial stages of developing the case presentation text, it became necessary to develop a programming format which would be sufficiently flexible to meet the institutional requirements of the course and yet would provide a defined structure to permit the programmer to orient and justify the component parts of the case presentations to be developed. The following model was used as a guide in the development of the case presentations in the text.

1. Model of a case presentation.

   a. Constructed-response frames. Figure I illustrates schematically the initial phases of a case presentation. The case begins with a summary of the Chief Complaint, and of the Presenting Illness. The statement is followed by an open-end question requiring a written response such as "What will your next step in management be?". The student is asked to write his response and then turn to the next page which gives him a number of options.

   b. Directory frames. The student is given a choice to obtain additional history, perform a general physical examination, get more laboratory data, or, if he thinks the patient's circumstances warrant it, to bypass further data-gathering and proceed directly into a plan of active treatment. The directory frame may offer him his choice of several different treatment plans.

   c. Purpose of constructed-response frames. The purpose of the initial question "What will your next step be?" is to encourage the student to find this step on his own, without the help of the checklist of multiple-choice options given in a directory frame. If the student's constructed response differs from all the options available to him in the directory frame, later revisions of the text can be revised so as to incorporate the student's response into the test of options, with branches leading to further frames, as appropriate. In a series of case presentations, remedial materials are sequenced so that by the time the student reaches later, more sophisticated cases, the discrepancies between his constructed responses and the options he is given tend to disappear.

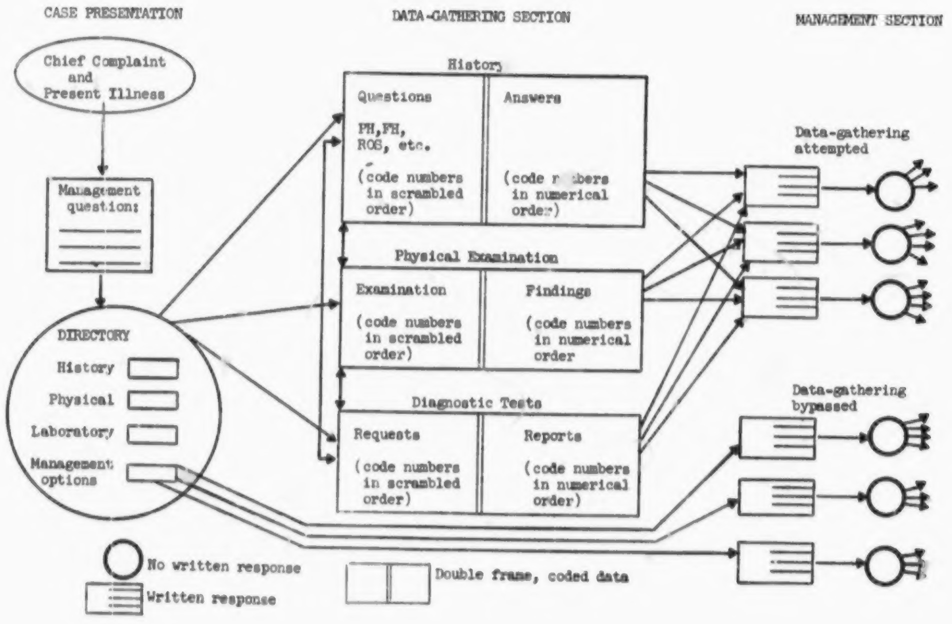
CASE PRESENTATION
DATA-GATHERING SECTION
MANAGEMENT SECTION
Chief Complaint and Present Illness
Management question:
DIRECTORY
History
Physical
Laboratory
Management options
History
Questions
PH, FH, ROS, etc.
(code numbers in scrambled order)
Answers
(code numbers in numerical order)
Physical Examination
Examination
(code numbers in scrambled order)
Findings
(code numbers in numerical order
Diagnostic Tests
Requests
(code numbers in scrambled order)
Reports
(code numbers in numerical order)
Data-gathering attempted
Data-gathering bypassed
No written response
Written response
Double frame, coded data

Figure I. Schematic Initial Phase of Case Presentations

d. *Information frames.* If the student selects an option that permits him to gather more information about the patient, he may be referred to frames which provide him with information about the patient's history, general physical examination, special examinations and various types of laboratory data and diagnostic procedures. These pages may consist of a prose paragraph of information, or, if more active participation by the student is desired, the page can be a coded data-gathering frame consisting of a numbered list of items about which the student is expected to want additional information. Each of these items is numbered in scrambled order. Adjacent to this list, there is a numbered list of "answers" (including physical findings, laboratory reports, and other data) presented in numerical order. The student must select each item about which he wishes information and find the answer with the corresponding code number on the adjacent list. He thus must identify specifically each item about which he wants further information before he is given the answer.

e. *Purpose of coded information frames.* The case presentation using coded data-gathering frames volunteers no summaries of information and in this way resembles the patient, the physical examination, and the laboratory. The student gets only the information he specifically seeks. In such case presentations, as in evaluations of real patients, there may be more than 100 items about which the student has the option of seeking further information. Most of these contribute almost nothing to the student's understanding of the patient's problem. Only by seeking the information, however, can the student learn which information is relevant. After he makes his choices, he can be informed by a simple code whether or not his choices were considered appropriate.

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2. Model of management program.

   a. Constructed response frames. Figure II shows the general scheme for presentation of management problems. In Frame 1, the student is asked a question which requires a written response. The question is often no more than a request to "please write down your next step." Some students are stumped by a question like this and fail to write down anything at all. When this occurs, the student is referred to an explanatory frame (Frame 2) which suggests a general approach which should be acceptable.

   b. Directory frames. After the student has written down his response, he turns to the next frame (Frame 3), which consists of a list of possible answers which he may have written, and a directory of where to proceed next.

   c. Remedial frames. If the student's answer is so unusual as not to be listed, he is referred to Frame 4, which explains that he overlooked the proper response and refers him to Frame 11 for remedial advice. This remedial advice may consist of a list of outside reading, or a referral to specific parts of other programmed materials such as the "content" text or a referral to the data-gathering frames of this case presentation, depending on the nature of the error.

   d. Explanation frames. Often the student will have written a wrong answer which has already been anticipated in the program and is listed among the multiple choices. Each of these listed wrong answers has its own explanatory frame which defines the student's error specifically and then refers him elsewhere for remedial advice or instruction.

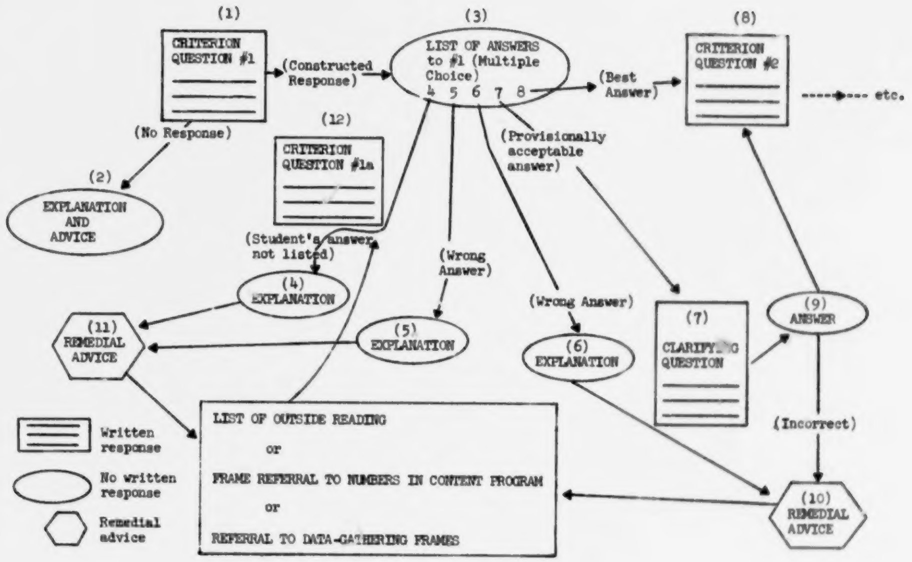
(1)
CRITERION QUESTION #1
(Constructed Response)
(No Response)
(2)
EXPLANATION AND ADVICE
(3)
LIST OF ANSWERS to #1 (Multiple Choice)
4 5 6 7 8
(Best Answer)
(8)
CRITERION QUESTION #2
etc.
(12)
CRITERION QUESTION #1a
(Provisionally acceptable answer)
(Student's answer not listed)
(4)
EXPLANATION
(Wrong Answer)
(Wrong Answer)
(5)
EXPLANATION
(6)
EXPLANATION
(7)
CLARIFYING QUESTION
(9)
ANSWER
(Incorrect)
(10)
REMEDIAL ADVICE
(11)
REMEDIAL ADVICE
LIST OF OUTSIDE READING
or
FRAME REFERRAL TO NUMBERS IN CONTENT PROGRAM
or
REFERRAL TO DATA-GATHERING FRAMES
Written response
No written response
Remedial advice

Figure II. General Scheme for Presentation of Management Problems Showing Constructed Response Questions with Branching Answers.

e. Provisional frames. The student may write an answer which is partially correct or provisionally acceptable. Under such circumstances, he may be referred to a frame such as Frame 7 which consists of a clarifying question, usually requiring a written answer. If he answers it correctly, he will be referred directly to the next decisive question and can proceed in the same way as if he had made a fully correct response in the beginning. If he fails to answer the clarifying question satisfactorily, he is referred for remedial instruction (Frame 10).

3. Model of results.

Outcome for patient. Sooner or later the student reaches the end of his program of management and is informed of the outcome for the patient. If he managed the problem appropriately, he is told so. If he has managed the problem inappropriately, he is told the consequences for the patient and the nature of his inadequacies. This is indicated schematically in Figure III. He is also given remedial advice as to how best to correct this error.

4. Model of summary questions.

Summary frames. The student who has managed the case successfully then may proceed to a series of frames which ask him to summarize the principles upon which he based his correct decision. These decisions also call for general "theoretical," "basic science," or other information of the sort which may be related only indirectly to his decisions in treating the patient. These summary frames shown diagrammatically in Figure IV can be used to test the student's "book knowledge."

D. Selection of Case Material.

1. Limitations of time. The case presentation format selected for the project seemed sufficiently flexible and comprehensive to permit achieve

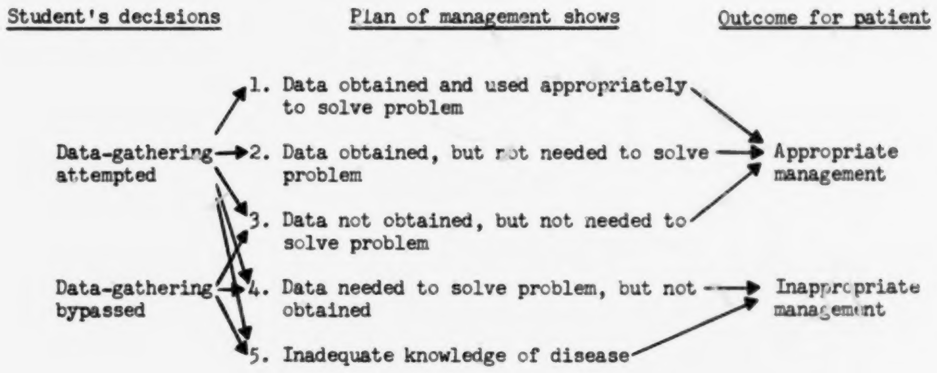
Student's decisions
Plan of management shows
Outcome for patient
Data-gathering attempted
Data-gathering bypassed
1. Data obtained and used appropriately to solve problem
2. Data obtained, but not needed to solve problem
3. Data not obtained, but not needed to solve problem
4. Data needed to solve problem, but not obtained
5. Inadequate knowledge of disease
Appropriate management
Inappropriate management

Figure III. Relationship of student's decisions to outcome for patient.

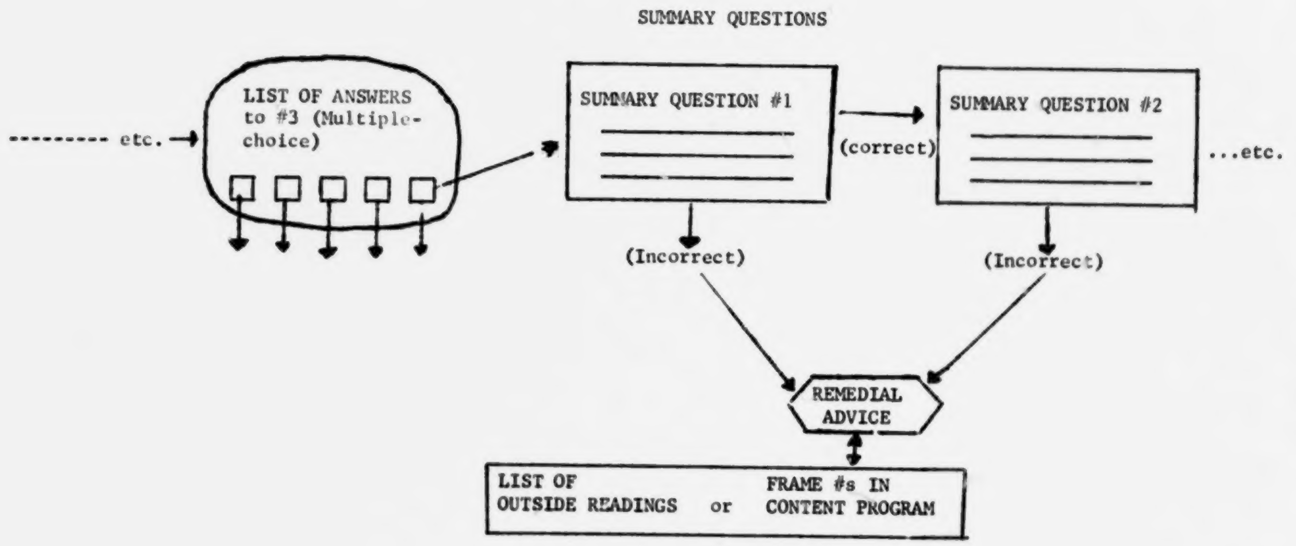
SUMMARY QUESTIONS
--------- etc.
LIST OF ANSWERS to #3 (Multiple-choice)
SUMMARY QUESTION #1
(correct)
SUMMARY QUESTION #2
...etc.
(Incorrect)
(Incorrect)
REMEDIAL ADVICE
LIST OF OUTSIDE READINGS or FRAME #s IN CONTENT PROGRAM

Figure IV. Schematic of Summary Frames with Appropriate and Inappropriate Answers

ment of all the teaching aims specified in "Requirements of the Course" *if sufficient time were available*. The research requirements of the project, however, dictated that the time students spent learning gynecologic oncology by means of programmed instruction be comparable to and preferably less than the time invested by control groups in learning gynecologic oncology from conventional materials. Hence, in selecting materials for case presentation programming, the most important objectives specified in "Requirements of the Course" were given preference over some of the more esoteric ones, especially the esoteric ones which would have required an excessive expenditure of programming time to insure adequate criterion performance by the students.

2. *Multi-purpose cases*. It was recognized that the material presented in the "content" text could be represented in case presentation format by a hundred half-hour case presentations without redundancy. To reduce the number of cases to a manageable number, the teaching objectives of the "Requirements of the Course" had to be combined into the fewest number of cases possible. Thus, each case presented or represented a number of different diseases, clinical problems, or teaching objectives. Although each case had a factual basis in a real life patient, frequently the problems of several real life patients would be combined into a single case presentation provided that this could be done without straining the credulity of the student.
3. *Method of selecting cases*. Before the actual frame writing began, a brief synopsis was written of each case presentation considered for inclusion in the program. The synopses were checked, singly and in

combination, with the "Requirements of the Course," and also with the corresponding frames of the "content" text. Modifications and transformations in the synopses were made to provide the most comprehensive coverage possible consistent with clinical realism.

4. Sequence of case presentations for initial tryouts.

   a. Sequence options. Each of the 35 case presentations prepared for the project was designed to represent specific cases of diseases and conditions which were covered in corresponding sections of the "content" text. The cases not only differed from each other in the "content" they represented, they also differed greatly in the complexity and sophistication of the programming techniques they employed, and in the kinds and degrees of diagnostic and therapeutic skills they demanded of the student. It was possible to arrange the case presentations in at least three orderly sequences.

      i. An order corresponding to the order of diseases and conditions presented in the "content" text.

      ii. An order representing increasing complexity and sophistication of programming methodology.

      iii. An order representing progressively increasing demands on the student's diagnostic and therapeutic knowledge and skill.

   b. Trial sequence. For the initial tryouts, it was elected to present the case presentations to the students in an order corresponding to that of the coverage of the same material in the "content" text. This was done for the following reasons:

i. It permitted the student without prior knowledge of the subject matter to master "content" and the "application" of the knowledge in an orderly sequence. If another order of case presentations had been chosen, it would have been necessary for the trial student to master all the material of the "content" text so as to prepare himself for the challenge of a case which might require him to diagnose and treat a patient with any disease covered in the "content" text.

ii. It rendered the "content" of each case presentation predictable. The student could prepare himself for the diagnosis and treatment of the patient simply by working his way through the next sequence of frames in the "content" text.

iii. With the problems of "content" de-emphasized, it was possible for the trial student to concentrate his attention and his criticisms on the problems of format and programming in the case presentation itself rather than on the "content" demands that the case presentation required of him.

VI. Revision of "Applications" Text.

A. Anticipated Problems of Revising Case Presentations. It was recognized that the revision of the case presentations, with their branching format, would require the use of many more student consultants than were needed in the revision of the linear "content" text. The process used for the linear text might serve very well for revision and validation of the "right answer" branches of each case presentation; but only by employing a large number of students varying greatly in their preparation for and personal approaches to the problem could one identify, revise and validate appropriate "wrong answer" branches. In each case presentation it would be necessary to identify the following:

1. Needed options (branches) which had been omitted by the programmer.
2. Needed options which failed to function properly because of inadequate or inappropriate programming technique.
3. Unnecessary options which were never selected by any student and could be deleted from the program.

B. What Function Does a Branch Serve? It was recognized that the frequency with which an option was selected was a poor index of its value to the program. An option might be selected by only one student out of 50 and yet if its remedial branch saved him from perpetuating a crucial error, such an option might be worth retaining in the program. At the other extreme, an option frequently selected by students might be no more than an alternate branch, without a didactic or remedial purpose, included in the text only to increase the student's illusion that he was being given the maximum freedom possible in managing the patient. It was also recognized that a "wrong answer" branch leading to a remedial sequence in the "content" text might be programmed perfectly and yet fail to fulfill its remedial purpose because of defective programming in the "content" text. It was anticipated that finding methods to detect, diagnose, and correct errors in "wrong answer" branches would be a time consuming and uncertain process. In retrospect, it appears that the initial difficulties were underestimated.

C. Consultants Used in Revising the "Applications" Text. The revision of each case presentation was accomplished with the help of consultants who worked through the cases in the following order:

1. Faculty members. Fellow faculty members and senior resident physicians in obstetrics and gynecology were used first. These consultants, all of whom were qualified clinicians with experience in the application of "content" knowledge to the care of real patients, worked through the cases as subject-matter experts. Their corrections were confined for the most part to the "right answer" branches. The purpose of their review was to make sure that the diagnostic and therapeutic aspects of the case presentations were as realistic, accurate and up-to-date as possible. After revision by several subject-matter experts, the "right-answer" branches of the case presentations were expected to function rather efficiently as self-tests for the student and would serve to demonstrate to him that he had not only mastered the "content," but also could apply it to resolve a specific clinical problem.
2. Sophomore students. Next was a group of sophomore medical students without prior exposure to either the case presentations or the "content" text. These students were asked to start each case presentation without having read the corresponding section in the "content" text and to work through remedial sequences in the "content" text only when specifically instructed to do so by the text. With this approach, it was hoped that the sophomore students would explore as many "wrong answer" branches as possible and by doing the appropriate remedial assignments in the "content" text, would ultimately complete the "right answer" branches successfully, thus demonstrating their learning of the material. It was expected that the programmers would not only obtain data on the

students' responses to the "wrong answer" frames, but would also learn whether or not the remedial sequences in the "content" text were sufficiently effective as teaching devices to permit the students to complete the cases successfully.

3. Senior students. The third group were senior medical students who had completed the course in gynecologic oncology as juniors, who were familiar with the "content" of the linear text, but who were not experts in its "application." These students were asked to review the appropriate material in the "content" text whenever they wished, before or after undertaking the case presentations. It was hoped that this group of students would select "wrong answer" branches which primarily represented defective applications of an adequate knowledge of "content," rather than deficiencies of both "content" and "application." An evaluation of the senior student's responses was expected to demonstrate whether or not these remedial sub-sequences in the "applications" text were adequate to permit the student to complete the case successfully.

D. Problems of Revision - Unforeseen Difficulties.

1. Responses of subject-matter experts. The case presentations, when presented to clinical subject-matter experts, benefited from much constructed criticism, correcting errors and deficiencies in the right answer branches. The wrong answer branches received very few criticisms. In general, the cases received favorable comments from the clinical consultants. "If these cases don't teach the students to work up patients, nothing will!" was the comment of a chief resident physician who had worked through all 35 cases.

2. Responses of sophomore students. When the cases were presented to sophomore student consultants for review, it soon became apparent that many students were failing to complete the cases. Typically, a student would work through the case until he made an error which led him to a remedial frame, which in turn advised him to correct his error by working through certain frames in the "content" text. The student, instead of following instructions as he was advised, encouraged, and even paid to do, skipped to the next case where he repeated the same behavior pattern. It seemed that the wrong answer branches, instead of motivating the student to recognize his deficiencies and learn from his mistakes, had an opposite effect and so discouraged the student that he was unwilling to continue with the case even when he was paid to do so on an hourly basis.

   a. Initial revisions. An inspection of these wrong answer branches which appeared to stop the student from further learning revealed that, for the most part, the student's wrong choices were not treated too sympathetically. In some instances when the student's response had been outrageously inadequate or inappropriate, remedial frames contained remarks which could be construed as biting or sarcastic. As a first step in revision, the biting and sarcastic remarks were removed. In certain cases even the outrageously wrong options leading to the remarks were deleted since merely listing such an option seemed to be construed as a reflection on the student's competence.

   b. Effect of revisions. The revised cases in which all student responses, whether right or wrong, were treated with courtesy and respect were then presented to a new group of sophomore students. Their reaction, for the most part, was the same as that of the first group of students. When they recognized that they had made a mistake, they discontinued their efforts to manage the case or to learn more about the patient's disease and went on to the next problem. The responses (or lack of responses) by the students gave the programmers no clues as to why the wrong answer frames were failing to function.

c. Reasons for failure. The cause of the unanticipated behavior of the student was determined by piecing together information obtained from interviews with many of these student consultants. In brief, it was this:

  i. The student saw each case presentation as a realistic portrayal of the doctor-patient relationship and recognized that the decisions demanded of him represented the decisions he would have to make as a physician caring for such a patient. He therefore looked upon the case presentation as a test of his ability to assume and carry out the responsibilities of a physician in a realistic manner. When he made decisions which were faulty and jeopardized the patient's welfare, or perhaps killed the patient, he saw himself as an incompetent bungler in the role of a physician.

  ii. Whether the student's error was the result of a lack of knowledge of the patient's disease, or from a slip-shod evaluation of the information available to him, or from poor judgment in spite of having all the information he needed to make the right decision, the effect upon the student was equally discouraging: he could see that he just wasn't cut out to be a doctor.

These observations led to the conclusion that many students, at the end of their sophomore year of medical school, are unprepared for evidence which suggests that they, too, will make mistakes which must be measured in human suffering or death. For such students a wrong answer branch which informs them, however gently, that the patient has suffered at their hands is such a painful experience that they are unable to continue the case.

d. Resolution of problem. Fortunately for the project, certain sophomore students were found who were sufficiently tough-minded to follow the instructions and complete the remedial assignments as required by the text. Appropriate corrections were made in the "applications" text and in the "content" text to permit succeeding students to correct their deficiencies of information and complete each case presentation successfully.

3. Reaction of senior students. Senior students, when started on the case presentations, had a characteristic pattern of behavior: they would complete one or two case presentations, making serious errors, and then insist on being given the "content" text to review in its entirety before they would proceed with further case presentations. After completing this "content" text, they could then complete the case presentations, making very little use of the wrong answer branches. When they did make mistakes, they were more than willing to review the remedial assignments in the "content" text.

E. Revisions of "Applications" Text after the First Year's Operational Use. In the spring of 1965, all responses of 44 students who worked through the 35 case presentations were tallied. A review of the responses seemed to justify the following observations:

1. There were surprisingly few "dead branches" in the text. Almost every option had been selected by one or more students.
2. In some cases, the format, instructions, or programming technique failed to communicate effectively.
3. Students, in working through the case presentations, needed a more immediate way to compare their own performance with that of expert clinicians. It was not enough, for example, simply to tell them at the end that they had killed the patient.
4. In the scrambled book which made extensive use of code numbers to provide information, typographical errors involving code numbers or pagination seemed to produce intense emotional reactions and surprising margin comments.

From the information obtained from the tally of student responses, changes were made in less than 5% of the frames. Errors of content were also corrected, and a code giving the preferred choices of expert clinicians was added to data-gathering frames.

F. Order of Approach. The tryouts of the "applications" text with student consultants had made it apparent that when students were given both programmed texts, they would use them in the following order:

FIRST, complete the "content" text in its entirety.

SECOND, complete the "applications" text, working through remedial assignments in the "content" text when instructed to do so.

VII. Unique Sequencing Aspects of Case Presentations.

A. Purpose of Original Sequence. Since the cases had been written in the same order as the "content" text, they were first tried out in this order.

This parallel presentation of cases made it possible to evaluate each case or group of cases with students as they progressed through the material rather than waiting for each student to complete the full course.

B. Disadvantages of Original Sequence for Operational Use. If the sequence of case presentations remained in its original order, paralleling the presentation of corresponding material in the "content" text, there would be disadvantages:

1. The diagnosis of each case presentation would be predictable in advance and would lose its element of challenge. The diagnostic workup in such cases becomes a matter of drudgery without the excitement of discovering the unknown.
2. Students would recognize such a sequence as unrealistic: patients with different diseases do not present themselves for care in the same sequence that their diseases are presented in the table of contents of a textbook.
3. There could be no orderly increase in the complexity in programming techniques used in presenting the cases. The most demanding cases would appear before the student had been prepared for them by working through a sufficient number of relatively straightforward cases.
4. The sequence did not permit an orderly increase in the demands made on the student for competence, industry, and sophistication in dealing with increasingly complex diagnostic and therapeutic problems in gynecologic oncology.

C. Final Sequence. In the sequence adopted for operational use, the cases were arranged according to the following principles:

1. Progressive increase in the difficulty from simple, familiar programming techniques to complicated, unfamiliar ones.
2. Progressive increase in the difficulty and complexity of diagnosis and/or treatment.
3. Separation of similar cases. Cases with closely related diseases, and cases with similar complaints but unrelated diseases, were separated from each other as widely as possible throughout the text, but were arranged in sequences according to principles 1 and 2 above.

The result, it was hoped, was a text which for a student who mastered the "content" of gynecologic oncology would offer a series of cases of progressively increasing challenge and surprise.

VIII. Comparisons of Revisions - "Content" Text vs "Applications" Text.

A. The "Content" Text.

1. Effect of consultants. The responses of student consultants to early drafts of the content text led to extensive revisions leaving scarcely a frame of the original draft intact.
2. The reason. The content text requires students to learn a new vocabulary and at the same time apply it to unfamiliar contexts. The failures of the original draft were primarily failures of communication.

B. The "Applications" Text.

1. Effect of consultants. The responses of student consultants led to very few changes in the format or programming techniques of the case presentations. The responses of the subject-matter experts (physicians with clinical experience) led to the correction of many defects in the "content" of the case presentations but few changes in the programming.

2. The reasons.

   a. The "applications" text assumed that the student has mastered the clinical vocabulary needed for the care of patients with gynecologic tumors. When the student's responses indicate that there is a communication failure because of his vocabulary deficiencies, he is referred to the "content" text for remedial work.

   b. The program writers, after the experience of writing and re-writing thousands of frames for medical students, had become relatively adept at writing frames and preparing instructions which communicated effectively as originally written. This was fortunate, because some of the pathways in the case presentations were never selected by try-out students and remained untested until the text was put into operational use.

CHAPTER FIVE

RESULTS

I. Comparability of Experimental and Control Groups.

A. Data Supporting Comparability of Groups at the Medical College of Georgia 1963-64.

1. For a comparison of groups A, B, B' and A' by weighted grade-point averages, see Table VII.
2. For a comparison of groups A, B, B' and A' according to Medical College Admission Test scores, see Table VIII.

Tables giving the grade scores and ranks of individual students are given in Appendix I.

B. Data Supporting Comparability of Groups at the Medical College of Georgia 1964-65.

1. For a comparison of groups A, B, B' and A' by weighted grade-point averages, see Table IX.
2. For a comparison of groups A, B, B' and A' according to Medical College Admission Test scores, see Table X.

Tables giving the grade-point averages and ranks of individual students are given in Appendix J.

C. Data Supporting Comparability of Study Groups at Other Medical Schools.

1. California College of Medicine. The 92 students of the sophomore class were divided into a control group of 45 students and an experimental group of 47 students on the basis of academic performance during the freshman year of medical school. Assurance has been given the Research Director of the project that this was done on as nearly an equal basis

TABLE VII

COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS ON WEIGHTED GRADE-POINT AVERAGES FOR GROUPS OF JUNIOR STUDENTS AT THE MEDICAL COLLEGE OF GEORGIA 1963-64

	Control	Experimental		Control
Group	I-A	II-B	III-B'	IV-A'
N	23	24	22	22
Mean	2.42	2.48	2.44	2.49
Range	1.75-3.19	2.00-3.75	1.27-3.51	1.83-3.75

	N	Mean	SD	t	P
Experimental	46	2.459	.45	.03	NS
Control	45	2.456	.40		

TABLE VIII

COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS ON MEDICAL COLLEGE ADMISSION TEST SCORES OF JUNIOR STUDENTS AT THE MEDICAL COLLEGE OF GEORGIA
1963-64

	Control	Experimental		Control
Group	I-A	II-B	III-B'	IV-A'
N =	23	24	22	22
Verbal *	47.0	48.2	49.3	50.0
Quantitative	50.0	50.6	48.2	51.6
General Information	47.5	49.9	49.1	49.3
Science	51.4	49.5	49.0	49.4

Sum of MCATS	N	Mean	SD	t	P
Experimental	46	49.2	8.5	.34	NS
Control	45	49.5	8.1		

*Last 5 dropped from all grades

TABLE IX

COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS ON WEIGHTED GRADE-POINT AVERAGES FOR GROUPS OF JUNIOR STUDENTS AT THE MEDICAL COLLEGE OF GEORGIA
1964-65

	Control	Experimental		Control
Groups	I-A	II-B	III-B'	IV-A'
N	24	24	23	21
Mean	2.55	2.48	2.46	2.13
Range	2.01-3.68	1.69-3.46	1.66-3.16	1.96-3.07

	N	Mean	SD	t	P
Experimental	47	2.48	.42	.06	NS
Control	45	2.50	.41		

TABLE X

COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS ON MEDICAL COLLEGE ADMISSION TEST SCORES OF JUNIOR STUDENTS AT THE MEDICAL COLLEGE OF GEORGIA
1964-65

	Control	Experimental		Control
Group	I-A	II-B	III-B'	IV-A'
N =	24	24	23	21
Verbal *	48.0	47.8	49.0	46.3
Quantitative	48.0	49.3	47.3	46.8
General Information	47.8	47.3	48.9	49.4
Science	48.2	48.2	49.9	46.5

Sum of MCATS	N	Mean	SD	t	P
Experimental	47	48.47	6.27	.699	NS
Control	45	47.66	4.81		

*Last 5 dropped from all grades.

as possible and that a comparison of the Medical College Admission Test scores of the two groups supported the assumption that the two groups were comparable. The supporting information from the college's Registrar's Office, however, has not yet been made available to the project.

2. State University of Iowa School of Medicine. The Medical College Admission Test scores by experimental and control groups and the grade-point averages by groups are shown on Table XI.
3. The University of Nebraska College of Medicine. The Medical College Admission Test scores by experimental and control groups are shown in Table XII.
4. The University of North Carolina College of Medicine. The combined averages for Medical College Admission Test scores and grade-point averages for experimental and control groups are shown on Table XIII.
5. The University of Vermont College of Medicine. The summation of Medical College Admission Test scores are combined by experimental and control groups in Table XIV. The listing of student individual scores is not available. However, the grade-point averages for the end of the first and second years are given.

D. Summary of Comparability of Study Samples.

1. The data from the Medical College of Georgia on previous academic performance, Medical College Admission Test scores, and class rank seems sufficient to justify the conclusion that the control and experimental groups were approximately equal. The experimental design of the project permitted the distribution of the students to be biased favoring the control groups, but the data suggests that this bias was not large enough to impair the comparability of the groups.
2. The data from the other medical colleges participating in the second year of the project are less complete than that from the Medical College of

TABLE XI

COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS ON MCAT SCORES AND GRADE-POINT AVERAGES FOR JUNIOR STUDENTS AT THE STATE UNIVERSITY OF IOWA SCHOOL OF MEDICINE 1964-65

GROUP		N	V	Q	GI	Sci	GPA
Control	I	10	53.2	55.8	55.4	55.4	3.1
	IV	13	50.3	55.3	54.2	52.8	3.2
	V	11	52.0	57.7	57.1	55.6	3.4
	VII	11	52.4	56.0	52.4	55.5	3.0
Experimental							
	II	9	53.0	51.0	55.8	52.9	2.9
	III	10	50.5	59.1	57.3	56.9	3.0
	VI	13	53.2	55.4	54.7	53.5	3.1
	VIII	11	48.3	50.0	52.9	52.6	2.8

Sum of MCATS	N	Mean	T*	P
Experimental	43	53.6	243	NS
Control	45	54.2		

CODE

V = Verbal
Q = Quantitative
GI = General Information
Sci = Science
GPA = Grade-Point Average
MCAT = Medical College Admission Tests

*Wilcoxon T rank test

TABLE XII

COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS MCAT SCORES OF JUNIOR STUDENTS AT THE UNIVERSITY OF NEBRASKA COLLEGE OF MEDICINE 1964-65

GROUP	N	V	Q	GI	Sci
Control I	10	47.6	52.2	48.4	49.3
III	9	49.6	52.5	52.6	54.3
V	9	56.2	51.0	57.7	54.7
VII	10	55.4	53.4	58.3	53.2
Experimental					
II	11	50.4	53.0	51.9	52.2
IV	10	50.4	52.0	53.0	51.7
VI	11	51.4	54.1	54.9	52.0
VIII	10	48.3	51.7	52.9	49.6

Sum of MCATS	N	Mean	T*	P
Experimental	42	52.9	229	NS
Control	38	51.9		

CODE

V = Verbal
Q = Quantitative
GI = General Information
Sci = Science
MCAT = Medical College Admission Tests

*Wilcoxon T rank test.

TABLE XIII

COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS ON MCAT SCORES AND GRADE-POINT AVERAGES FOR SENIOR STUDENTS AT THE UNIVERSITY OF NORTH CAROLINA COLLEGE OF MEDICINE 1964-65

GROUP		N	V	Q	GI	Sci	GPA
Experimental	I	14	52.0	51.8	51.3	51.6	2.0
	III	16					
Control	II	14	59.8	56.3	49.2	51.8	2.2

Sum of MCATS	N	Mean	T*	P
Experimental	30	51.7	16	NS
Control	14	51.8		

CODE

V = Verbal
Q = Quantitative
GI= General Information
Sci = Science
GPA = Grade-Point Average
MCAT = Medical College Admission Tests

*Wilcoxon T rank test.

TABLE XIV

COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS ON TOTAL SUMMARY OF MCAT SCORES AND FIRST AND SECOND YEAR GRADE-POINT AVERAGES FOR JUNIOR STUDENTS AT THE UNIVERSITY OF VERMONT COLLEGE OF MEDICINE 1964-65

GROUPS		N	AVERAGE OF MCAT SCORES	GRADE-POINT AVERAGE	
				FIRST YEAR AVERAGE	SECOND YEAR AVERAGE
Control A	I, IIIa	22	56.7	83.5	82.7
Experimental B	II, IIIb	23	56.7	81.1	82.3
	P-value		NS	NS	NS

MCAT = Medical College Admission Tests

Georgia. Each of these schools, however, had a long-standing administrative policy of requiring that the division of each class into smaller groups be accomplished without distorting the academic comparability of the groups. In no school were the students permitted to assign themselves to groups by a process of self-selection. There is no evidence that there was a deliberate bias in the assignment of students, favoring either the control or the experimental groups, in any school participating in the project.

II. Course Content Comparability for Control and Experimental Groups.

A. Comparability of Content at the Medical College of Georgia, 1963-64.

1. Data available. The information presented in Chapter Two, page 9 describing the teaching materials, and in Chapter Three, page 16 describing the experimental design of the project, and in Chapter Four, page 35, describing the development of the teaching materials suggests that in the first year of the project every effort was made to insure a virtual duplication of coverage of "content" in control and experimental groups. Materials are available to make detailed comparisons of the coverage of content in the eight hours of tape-recorded lectures with the 30,000 words of programmed "content" text. Such a study, although possible, is not practical within the limits of this report.

2. Partial irrelevance of content comparability. The results of such a study would still leave room for large errors in interpreting the results of the testing program. The 216 questions of the Special National Board Examinations of OB-GYN Neoplasms sampled less than 10% of the material presented by the lecturer and by the programmed text and included about a dozen questions which were not covered in either

teaching method. Since the content covered by the tests represented such a small portion of the content covered by the two teaching programs, slight changes of emphasis in the teaching of content might be expected to have produced important changes in test scores, without producing obvious discrepancies between the two teaching methods in the coverage of content. The reason that this did not occur is that neither the lecturer nor the program writer, at the time of preparing teaching materials, was aware of the precise content of the questions of the Special National Board Examinations in OB-GYN Neoplasms, nor did either make any effort at a later date to include in his teaching "answers" to the examination questions.

B. Comparability of Content at the Medical College of Georgia, 1964-65.

1. During the second year of the project, all students in control and experimental groups received the same "content" programmed text. Thus the basic coverage of content was the same for all groups. The experimental groups, in addition, received the "applications" text. This text was designed to contain as little new "content" as possible. The control groups received no comparable special training in "application" other than their regular work in the wards, clinics and conference rooms, which the experimental groups also received. In this year the comparability of course content between control and experimental groups depended not so much on the nature of programmed texts they received as on their distribution of study time between the texts.

C. Comparability of Course Content in Other Medical Schools, 1964-65.

1. Experimental groups. In the five schools participating in the cross-validation study, experimental groups received uniform treatment; they were given the "content" programmed text at the beginning of the period

of instruction. The experimental groups were denied access to the programs of formal classroom instruction given to some control groups.

2. Control groups. There was no uniformity of "content" or method of teaching control groups in the different schools. Each school was free to teach as much or as little of the "content" of gynecologic oncology as it saw fit. Instructors of control groups were not denied access to the Special National Board Examinations of OB-GYN Neoplasms administered to their students as pre- and post-tests. Whether any instructors took advantage of this opportunity to alter their teaching of control groups to teach "answers" to the examination questions is unknown, but is considered to be most unlikely.

III. Time to Criterion Records.

A. Collection of Data. All students participating in all phases of the project in all schools were required to turn in completed time records stating their study time in learning gynecologic oncology (See Appendix F). The records required information in the following categories:

1. Hours attending lectures or seminars in gynecologic oncology.
2. Hours reading about gynecologic neoplasms in assigned textbooks.
3. Hours reading other texts or articles about gynecologic neoplasms.
4. Number of patients with gynecologic neoplasms assigned to student.
    a. "New" patients (previously unassigned to a student).
    b. "Old" patients (reassigned).
5. Hours studying programmed text (if any).

Students turned them in at the conclusion of the clerkship or period of instruction. Students were advised that their records would be more accurate and hence more valuable to the project if they were kept on a daily or weekly basis rather than filled in only at the end of the clerkship.

Students were also advised that they were to record only the time they spent learning gynecologic oncology and should exclude from the record any time spent studying other aspects of obstetrics and gynecology.

B. Summary of Study Time Records. (See Table XV)

1. Medical College of Georgia, 1963-64. The experimental groups achieved their learning with a saving of time almost equivalent to the time that control groups spent attending the lectures.
2. Medical College of Georgia, 1964-65. Experimental groups completed both the "content" text and the "applications" text in about the same time that the control group spent completing the "content" text alone. For both groups, the expenditure of time was slightly greater than that of the control group of the preceding year.
3. Five other schools, 1964-65. The study time of experimental groups varied considerably from school to school. The study time of control groups varied even more greatly and followed no consistent pattern with regard to the experimental groups at each school. The data, however, do not favor a saving of time for experimental groups.

IV. Learning of "Content."

A. Immediate Achievement of Learning of "Content."

1. Medical College of Georgia, 1963-64. The achievement of experimental groups was at least as good as that of the control groups and was accomplished with a significant saving of time (see Table XVI).
2. Medical College of Georgia, 1964-65. Experimental groups who received both the "content" text and the "applications" text learned "content" as efficiently as did control groups who received the "content" text alone (see Table XVII).

TABLE XV

SUMMARY OF TIME RECORDS, ALL SAMPLES

CONVENTIONAL INSTRUCTION, CONTROL GROUPS

SCHOOL	YEAR	N	SCHEDULED CLASSROOM HOURS	CLAIMED CLASS HOURS AVERAGE	OTHER STUDY TIME			COURSE COMPLETION TIME		
					Aver.	Range	S.D.	Aver.	Range	S.D.
M.C.Ga.	1963-64	43	8[1]	6.2	22.1	6-56	11.3	28.3	13-63	11.2
Calif.	1964-65	46	8[1]	8	14.4	0-50	9.3	22.4	8-58	9.3
Iowa	1964-65	45	2-3[2]	36.4	23.7	3-58	8.8	23.7	plus seminars	
Nebr.	1964-65	35	5-10[3]	6.9	11.6	4-23	4.9	18.5	6-49	8.9
N. C.	1964-65	14	1-9[4]	20.1	28.1	6-59	17.1	28.1	plus seminars	
Vt.	1964-65	22	5-12[5]	17.6	9.5	5-17	4.2	9.5	plus lectures	

PROGRAMMED INSTRUCTION, "CONTENT" TEXT GROUPS

			TEXT COMPLETION TIME								
			Aver.	Range	S.D.						
M.C.Ga.	1963-64	45	14.7	9-26	4.0	7.0	0-17	4.4	21.7	13-38	5.9
Calif.	1964-65	45	13.0	5-24	4.5	9.4	0-20	5.2	22.4	8-35	6.8
Iowa	1964-65	45	15.5	8-25	4.4	28.6	0-70	18.0	44.1	12-88	18.7
Nebr.	1964-65	39	12.2	5-21	3.6	4.6	0-30	7.9	16.8	5-42	9.0
N.C.	1964-65	15	13.6	4-27	6.3	20.3	0-96	25.4	33.9	4-108	27.1
Vt.	1964-65	23	18.7	4-57	12.6	4.6	0-25	7.6	23.3	8-82	15.8
M.C.Ga.	1964-65	43	18.9	7-34	6.6	11.5	0-48	12.5	31.9	10-79	16.5

PROGRAMMED INSTRUCTION, "COMPOSITE" TEXT GROUPS

M.C.Ga.	1964-65	45	22.9	13-35	6.3	11.2	0-50	11.1	34.1	17-83	13.9
"content" text			14.2	8-29	4.4						
"application" text			8.7	4-18	3.4						

1. Formal lectures
2. Joint conference for juniors and seniors every two weeks.
3. 1-2 hour tumor seminar held weekly for 5 weeks on clerkship with OB emphasis
4. Weekly seminars, varying in tumor coverage.
5. Lectures in junior year (clerkship in senior year).

TABLE XVI

COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS ON SPECIAL NATIONAL BOARD EXAMINATIONS IN OB-GYN NEOPLASMS, MEDICAL COLLEGE OF GEORGIA 1963-64.

	N	NB Special Examinations		
		Pre-	Post-	Gain
Control				
A and A'	45	57.8	85.0	27.2
Experimental				
B and B'	46	56.3	85.9	29.6
t *		.8	.6	
Significance		NS	NS	

*Difference in mean scores.

TABLE XVII

COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS ON SPECIAL NATIONAL BOARD EXAMINATIONS IN OB-GYN NEOPLASMS, MEDICAL COLLEGE OF GEORGIA 1964-65

	N	NB Special Examinations		
		Pre-	Post-	Gain
Control				
A and A'	45	51.6	83.3	31.7
Experimental				
B and B'	47	53.7	84.7	31.0
t *		1.0	.7	
Significance		NS	NS	

*Difference in mean scores.

3. Five other medical colleges, 1964-65. In every school, the "content" text consistently produced more learning than did the school's conventional teaching program. (see Table XVIII).

B. Retention of Learning of Content.

1. Method. The Examination in Obstetrics and Gynecology of the National Board of Medical Examiners, Part II, was administered to whole classes at the Medical College of Georgia according to the following schedule:

May 1963, the Junior Class
May 1964, the Junior Class and the Senior Class
May 1965, the Junior Class and the Senior Class

a. The class tested in May 1963 as juniors and again in May 1964 as seniors was a control group. These students had completed their training in obstetrics and gynecology as juniors prior to the start of the project and had no contact with the project as seniors during the year 1963-64.

b. The class tested as juniors in May 1964 and again as seniors in May 1965 was an experimental group in that all students in this class participated in the project, half as controls in the lecture group, and half as experimental students in the programmed text group.

c. The class tested as juniors in May 1965 was an experimental group, since all students participated in the project, half receiving both the "content" text and the "applications" text and the other half receiving the "content" text alone. A measure of retention of learning for this group will not be available until after they are re-tested as seniors in May 1966.

2. Special data collected. The National Board of Medical Examiners supplied categorical analyses for each class and for each experimental and control division within the classes which participated in the project. Category 11, Neoplasms, represents the "content" of the project's teaching programs. The results are shown in Tables XIX - XXI.

TABLE XVIII

COMPARISON OF EXPERIMENTAL AND CONTROL GROUPS ON SPECIAL NATIONAL BOARD EXAMINATIONS IN OB-GYN NEOPLASMS, FIVE OTHER MEDICAL SCHOOLS 1964-65.

		N	NB Special Examinations		
			Pre-	Post-	Gain
U. of Vermont Medical School	Cont.	22	56.8	80.2	23.4
	Exp.	23	57.6	85.2	27.6
	t		.03	2.3	
	Significance		NS	$<.05$	
U. of N.C. Medical School	Cont.	11	67.9	84.9	17.0
	Exp.	30	61.4	89.3	27.9
	t*		2.9	2.1	
	Significance		$<.01$	$<.05$	
U. of Nebraska Medical School	Cont.	38	61.6	79.8	18.2
	Exp.	42	64.6	84.7	20.1
	t		1.3	2.7	
	Significance		NS	$<.01$	
State U. of Iowa Medical School	Cont.	45	63.1	88.6	2[illegible].5
	Exp.	43	61.9	93.3	31.4
	t		.1	3.2	
	Significance		NS	$<.01$	
California College of Medicine	Cont.	45	45.5	76.0	30.4
	Exp.	47	47.0	81.0	34.0
	t		1.2	3.2	
	Significance		NS	$<.01$	

*Note that the pre-test indicated the control group's mean was significantly better but post-test indicates significant gain for experimental groups!

TABLE XIX

COMPARISON OF RAW SCORE MEANS AND STANDARD DEVIATIONS FOR EIGHT GROUPS OF JUNIOR STUDENTS ON NATIONAL BOARD PART II COMPREHENSIVE EXAMINATIONS IN OBSTETRICS AND GYNECOLOGY, MEDICAL COLLEGE OF GEORGIA, MAY 1964 and MAY 1965

	N	NBME Final Grade (May 1964) Mean	SD
1963-64			
A - Control	23	79.1	5.1
A'- Control	22	83.4	4.6
B - Experimental	24	79.2	4.2
B'- Experimental	22	78.9	4.4
1964-65		(May 1965)	
A - Control	24	78.8	5.4
A'- Control	21	82.5	3.5
B - Experimental	24	82.2	4.9
B'- Experimental	23	80.6	5.2

TABLE XX

COMPARISON OF MEAN PERCENTAGES, BY CATEGORIES, OF NATIONAL BOARD CANDIDATES AND JUNIOR STUDENTS TAKING COMPREHENSIVE EXAMINATION IN OBSTETRICS AND GYNECOLOGY, MAY 1963, MAY 1964, MAY 1965

	MEAN PERCENTAGES					
CATEGORY	Juniors 1963		Juniors 1964		Juniors 1965	
(Examination Code)	(KMB)		(LMB)		(0420S)	
	NB	MCG	NB	MCG	NB	MCG
1. Embryology, Anatomy and Physiology of the Female Organs of Reproduction	67.3	63.3	72.7	65.5	77.8	66.8
2. Physiology and Ecology of Woman	74.3	65.9	70.0	65.9	75.8	73.9
3. Normal Pregnancy: Physiology, Biochemistry, Psychology, Diagnosis, Management	65.3	62.0	63.1	54.2	77.0	66.7
4. Physiology and Conduct of Normal Labor and Parturition; the Newborn	64.9	63.8	65.0	57.4	71.0	63.0
5. The Puerperium; Normal and Abnormal	66.2	58.7	77.1	64.0	76.0	48.0
6. Complications of Pregnancy	71.9	67.2	69.7	64.8	66.7	57.1
7. Complications of Labor and Delivery	58.3	56.6	68.8	57.9	75.9	69.0
8. Disturbances of Function	63.2	60.4	84.7	76.4	75.3	66.8
9. Anatomic Pelvic Disorders	65.4	60.6	50.0	42.6	83.6	80.0
10. Infections	78.5	71.9	68.9	56.8	52.6	44.3
11. Neoplasms	71.9	62.8	66.2	69.9	67.9	73.7

NB = National average mean percentages for candidates taking the National Boards for licensure.

MCG = Medical College of Georgia mean percentage averages taking the National Boards.

TABLE XXI

COMPARISON OF MEAN PERCENTAGES, BY CATEGORY, FOR MEDICAL COLLEGE OF GEORGIA STUDENTS AT END OF JUNIOR AND SENIOR YEARS WITH CANDIDATES FOR LICENSURE NATIONAL BOARD COMPREHENSIVE EXAMINATIONS IN OBSTETRICS AND GYNECOLOGY

Category		May 1964 Junior Year			May 1965 Senior Year	
	NB (LMB)	Control	Experimental	NB (0420S)	Control	Experimental
1	72.7	64.5	56.5	77.8	53.8	63.6
2	70.0	67.1	64.7	75.8	61.1	63.2
3	63.1	54.7	53.7	77.0	61.6	61.4
4	65.0	59.8	55.1	71.0	63.5	61.7
5	77.1	64.9	63.1	76.0	27.0	44.0
6	69.7	67.7	62.1	66.7	54.1	52.4
7	68.8	62.0	53.9	75.9	63.4	61.5
8	84.7	75.5	77.3	75.3	67.8	63.5
9	50.0	42.6	42.6	83.6	77.4	77.9
10	68.9	59.6	54.7	52.6	43.3	38.1
→ 11	66.2	70.0	69.7	67.9	59.4	62.7

3. Summary of results of "retention" data.

   a. As measured by the National Board Examinations, the experimental teaching programs, both by lecture and by programmed text, produced a remarkable improvement in average scores for Category 11, Neoplasms, for students participating in the project, as compared with students who had received their instruction in the year prior to the start of the project. The improvement in Category 11 was not accompanied by improvements in the other ten categories.

   b. The results of re-testing a year later indicate that the interval of one year is sufficient to abolish evidence for improved scores in Category 11. Re-testing of seniors at the time of their graduation revealed essentially the same pattern of scores whether their teaching as juniors had been by means of programmed texts, special lectures prepared for the project, or by the ordinary departmental teaching conducted prior to the start of the project.

   c. The programmed text designed to teach "content" did not produce an improvement in retention of learning when retention was measured over a one-year interval during which the students were prevented from relearning from the text by being denied access to it.

V. Learning of "Application."

A. Measurements of "Application" By Oral Examinations.

1. Method. At the Medical College of Georgia, In January and in May of each year of the project, two visiting judges, working as a team, conducted interviews at 30-minute intervals with all students serving clerkships in obstetrics and gynecology during the current and the preceding quarter. Students from experimental and control groups

were presented to the judges in scrambled order. The judges conducted the interviews using a case presentation format in which students had an opportunity to demonstrate their ability to apply their knowledge of the "content" of gynecologic oncology to specific problems of patient care.

2. Scoring. Each judge rated each student independently with regard to his knowledge of "content" and his skill in its "application." The judges then discussed the student's performance with each other and arrived at a "final pooled grade" by consensus. All ratings were expressed using the following five-point scale.

0 = Unsatisfactory, without reservation.

1 = Borderline or questionable knowledge, performance, ability. Passing subject to Promotion Board.

2 = Satisfactory knowledge and performance - average.

3 = Better than average

4 = All-round superior student with above average preparation, capabilities, performance, interest, knowledge, drive, etc.

3. Results. The average scores for the combined control and experimental groups of each year of the project at the Medical College of Georgia are shown in Table XXII.

4. Summary of results.

   a. At the Medical College of Georgia in 1963-64 there was a positive but not significant difference in the combined scores of control groups, taught by lectures, and experimental groups taught by the "content" programmed text favoring the experimental groups.

   b. At the Medical College of Georgia in 1964-65, there was an observable difference in the combined scores of experimental groups,

TABLE XXII

COMPARISON OF "COMPOSITE" ORAL GRADES BY EXPERIMENTAL AND CONTROL GROUPS OF JUNIOR MEDICAL STUDENTS AT THE MEDICAL COLLEGE OF GEORGIA FOR BOTH YEARS.

DATE	GROUP	N	SUM	AVERAGE
January 13-17, 1964	Control A	23	46	2.0
	Experimental B	24	62	2.6
May 4-8, 1964	Experimental B'	22	38	1.7
	Control A'	22	46	2.1
January 11-15, 1965	Control A	24	42	1.8
	Experimental B	24	56	2.3
May 3-7, 1965	Experimental B'	23	52	2.3
	Control A'	21	45	2.1

		N	Mean	SD	t	P
1963-64	Control	45	2.0222	.866	.789	NS
	Experimental	46	2.1739	.957		
1964-65	Control	45	1.9333	1.044	1.736	<10%
	Experimental	47	2.2978	1.021		

who received the "composite" text (the "content" and the "applications" text used together) and the control groups which received the "content" text alone. The difference favored the experimental group and was significant at the 10% level of confidence.

B. Measurement of "Application" by Written Examinations.

1. The diagnostic tests. Nine tab-item clinical problem-solving tests were prepared for use in the project at the Medical College of Georgia in 1964-65. Of these, eight were primarily diagnostic in nature. The format and content of these tests have been described in Chapter II and in Appendix E. The schedule for administering the tests is given in Chapter III, page 31. The students' performance at the beginning of their clinical training in obstetrics and gynecology was so erratic and resembled so closely the scores that might be obtained by non-medical persons marking the answer sheets by chance that a detailed evaluation of their pre-test performance was abandoned as being unworthy of further effort.

The scoring of the post-tests, however, can be considered under the three skills measured by the tests.

a. Diagnostic Process (comprehensiveness and appropriateness of diagnostic workup). Four post-tests had sections dealing with History, Physical Examination, and Diagnostic Tests and Procedures. In effect, each student was given over 350 "yes-no" options in gathering information about the four cases. These options had been categorized by the residents as:

i. Essential, required by nature of the problem,
ii. Routine screening or survey item,
iii. Useless but harmless item,
iv. Contraindicated, harmful item.

Tables XXIII and XXIV compare the performance of control and experimental groups in selecting options in these categories.

The data in the tables suggest that experimental groups who had received the "applications" text were more thorough in the diagnostic workup of their patients than were students in the control groups who received only the "content" text. The experimental students, in general, selected more "essential" and more "routine" items than did students in the control groups. In a less consistent fashion they also tended to select more "useless" or "contraindicated" items than did control students, especially in the first half of the year. The results are not directly comparable, however, because the series of tests given to experimental and control groups differed markedly in the number and classification of "useless" and "contraindicated" items in each test.

b. Diagnostic product (accuracy and completeness of diagnosis).

i. Unrecognized communication problem. In each of the four "diagnosis" post-tests, the Diagnostic Product sections recorded satisfactorily the diagnostic judgments of the criterion group of senior resident physicians, and were considered acceptable by faculty members who took the test. With the junior students, however, this section was an unqualified failure, for reasons which were not suspected until too late in the academic year to make appropriate corrections. The difficulty lay in a failure of communication of the test format.

ii. Instructions on tests. The diagnostic product section of each test consisted of a list of as many as 50 different

TABLE XXIII

COMPARISON OF FIRST EXPERIMENTAL AND CONTROL GROUPS ON CLINICAL PROBLEM-SOLVING TESTS, JUNIOR MEDICAL STUDENTS MEDICAL COLLEGE OF GEORGIA 1964-65

	# Choices	%	Possible Choices	Significance* Level
Control Group A N = 24				
L = Routine Items	1729	42	4152	
M = Indicated Items	1595	62	2592	
Total	3324	49	6747	
Experimental Group B N = 24				<.05
L = Routine Items	2322	59	3960	
M = Indicated Items	1991	72	2784	
Total	4313	64	6744	
Control Group A N = 24				
N = Not indicated	157	11	1440	
P = Contraindicated	36	19	192	
Total	193	12	1632	
Experimental Group B N - 24				NS
N = Not indicated	274	20	1368	
P = Contraindicated	83	29	288	
Total	357	22	1656	

TABLE XXIV

COMPARISON OF SECOND EXPERIMENTAL AND CONTROL GROUPS ON CLINICAL PROBLEM-SOLVING TESTS, JUNIOR MEDICAL STUDENTS MEDICAL COLLEGE OF GEORGIA
1964-65

	# Choices	%	Possible Choices	Significance Level
Experimental Group B' N = 23				<.10
L = Routine Items	3129	66	4738	
M = Indicated Items	1982	75	2645	
Total	5111	69	7383	
Control Group A' N = 21				
L = Routine Items	2148	52	4158	
M = Indicated Items	1800	70	2583	
Total	3948	59	6741	
Experimental B' N = 23				NS
N = Not indicated	288	21	1403	
P = Contraindicated	43	23	184	
Total	331	21	1587	
Control Group A' N = 21				
N = Not indicated	195	16	1197	
P = Contraindicated	47	25	189	
Total	242	17	1386	

disease states. The student was asked to select AS MANY as he considered appropriate to define the patient's problem completely.

iii. Performance by students. Students whose previous clinical experience was entirely in surgical disciplines recorded their diagnosis in this section by selecting only the "most likely," "best established," or "working" diagnosis which they could use as the basis for planning further management of the patient. Departmental residents and faculty members in obstetrics and gynecology also followed this approach. This behavior represented the appropriate response called for in the instructions. Unfortunately, students whose prior clinical experience had included non-surgical specialties such as internal medicine and psychiatry followed a different pattern. They selected not only the "working" diagnosis, but also most of the other diagnoses, many of which were mutually exclusive, which they had considered as diagnostic possibilities during parts of the workup.

iv. Explanation of failure. The students who adopted this approach seemed to be following a recommended medical practice: To list as a diagnostic possibility every diagnosis, no matter how unlikely, that cannot be excluded with absolute certainty. Unfortunately, the test instructions, by failing to make it clear to the student that he should specify only the "best" or "working" diagnosis, and not a list of differential diagnoses, made it impossible to distinguish the students who had selected a list of differential diagnoses as a matter of prudent medical practice from the other students who had arrived at the correct diagnosis only after making a number of bad guesses and recording them, and furthermore made it impossible to identify still other students who had attempted to arrive at the right answer by using a "shotgun" approach to the answer sheet on the assumption that there could be no penalties for wrong answers.

v. *Scoring abandoned*. The failure of the test to communicate to the student instructions which were taken for granted by the departmental residents, faculty members, and trial students used in developing the tests made it necessary to abandon attempts to score the students' performance in Diagnostic Product.

c. *Therapeutic product.*

i. *Format and scoring*. Each of the four post-tests emphasizing diagnostic skills also contained a therapy section. These sections contained as many as 50 items from which as many management options as necessary could be selected. A system of pattern scoring had been developed by the criterion group of resident physicians. This scoring system worked satisfactorily for faculty members.

ii. *Student performance*. In the four tests, the scores of students in the therapeutic product sections were extremely erratic and seemed to bear little relationship to the students' performance in other parts of the test.

iii. *Scoring dilemma*. Since in each test the formulation of an appropriate program of therapy required that the student first have in mind the correct diagnosis, only those students who had the correct diagnosis in mind at the start of the section on therapy could have their skills as therapists measured on an equal basis. Students who started the section with a wrong diagnosis in mind would invariably select a plan of therapy which was inappropriate for the patient (though not necessarily for their erroneous diagnosis). The problems of communication in the diagnostic product section of each test were such that in the majority of the tests, it was impossible to determine whether or not the student had the correct diagnosis in mind.

iv. Scoring abandoned. The lack of this information made it impossible to score the Therapeutic Product sections of the tests completed by different groups of students on an equal basis. Therefore attempts to score these sections of the four tests were abandoned as futile.

2. Management test.

a. Scoring. Of the clinical problem-solving tests, only one, Test B, was developed with the specific purpose of measuring skill in management of a complex problem. The diagnostic process in this test was a simple one and included only eight items. The test, described in detail in Appendix E, required the student to make as many as eight difficult therapeutic decisions, in sequence, each of which involved the weighing of multiple factors and variables. In each sequenced decision, one variable at a time was altered and the student was asked to make one selection from as many as ten options, most of which remained constant from decision to decision. The therapy section of this test was scored using the trial scoring system. The categories are given as follows:

Therapeutic Product (treatment and disposition)

A	Best management (recommended at our institution)
B	Alternate correct management (often recommended at other institutions)
C	Acceptable management (may involve more risk or mutilation than necessary but is appropriate to the problem)
D	Inadequate management. (Usually undertreatment, with non-fatal consequences)
E	inappropriate management. (Involves grave unnecessary risks or major unnecessary mutilation).
F	Fatal mismanagement. (Whether by errors of omission or commission)
Z	Subsidiary diagnostic item
Z_Z, Z_A, Z_B, Z_C, Z_D, Z_E, Z_F	Subsidiary item implying that the subscript letter must also be scored whether or not the student marked it (i.e., Z_A is marked, score both A and Z_A)

In scoring this test, these categories were weighted as follows:

A = 100
B = 100
C = 75
D = 50
E = 25
F = 0
Z = 0

Results. The scores of the four groups of students, two control and two experimental, participating in the project at the Medical College of Georgia during 1964-65 are given in Table XXV.

3. Summary of results. Students in experimental groups who received both the "application" and the "content" programmed texts achieved observably higher average scores in this "management" test than did the control students who received only the "content" programmed text. The difference favoring the experimental group is significant at the 1% level of confidence.

VI. Attitudes of Students.

A. Attitude Toward "Content" Text. Table XXVI shows a tally of the seven total classes given the attitude survey on sample items: 3, 4, 7, 19, and 21. For a full summary of these attitude surveys, see Appendix O. Samples of statements made by students on the open-ended items on the attitude survey are given in Table XXVII.

TABLE XXV

COMPARISON OF FOUR GROUPS TAKING MANAGEMENT TEST, TEST B, MEDICAL COLLEGE OF GEORGIA 1964-65

			N	AVERAGE SCORES TEST B (MAXIMUM POSSIBLE 700)	%
Group	A	Control	24	219	31
Group	B	Experimental	24	481	69
Group	B'	Experimental	23	536	77
Group	A'	Control	21	450	64

	N	Mean	SD	t	P
Control	45	326	184	5.93	<.01
Experimental	47	508	94		

TABLE XXVI

SAMPLE OF ATTITUDE SURVEY ITEMS - "CONTENT" TEXT.

ITEMS: 3, 4, 7, 19, and 21 (Seven samples total N = 323)

3. Now that I have completed the course, I think this form of programmed teaching is

1. Excellent	68 *
2. Very good	153
3. All right	56
4. Poor	14
5. Completely unacceptable	3

4. Compared to MOST teaching methods I have encountered, this form of instruction is

1. Far superior	44
2. Better	177
3. About the same	41
4. Inferior	30
5. Extremely inferior	1

7. The programmed material was intellectually challenging

1. Throughout	20
2. Most of the time	150
3. Sometimes	100
4. Infrequently	21
5. Very rarely	5

19. For some other medical subjects I would choose programmed instruction

1. In preference to all other forms	63
2. With approval	169
3. Maybe	38
4. With hesitation	18
5. Only as last resort	9

21. If this text were available in a bookstore, I would recommend that others

1. Buy it and use it frequently	150
2. Buy it and use it occasionally	94
3. Borrow but don't buy it	38
4. Accept it as a gift only	11
5. Avoid it completely	4

*Number of students making this choice

TABLE XXVII

SAMPLE OF STATEMENTS MADE BY STUDENTS ON OPEN-ENDED ITEMS ON THE ATTITUDE SURVEY
(Six Schools)

A. Things you liked about this programmed course: (five most common comments)

1. Brevity, conciseness, clarity
2. Easy learning
3. Illustrations
4. Organization
5. Challenging and interesting

B. Things you disliked about this programmed course: (five most common comments)

1. Format, i.e., lack of references
2. Too long or too short, i.e., subject not covered or covered too much
3. Ambiguity
4. In some areas, I felt, too often, I was "spoon fed."
5. Don't feel that subject matter is retained

C. Changes you think should be made to improve the programmed text: (five most common comments)

1. Add references, index, table of contents
2. More illustrations
3. Case presentations
4. Correction of typographical and grammatical errors
5. Eliminate or add repetition

D. How do you think programs such as this could be of most value to medical students? (five most common comments)

1. Review, i.e., National Board tests
2. Mass of basic information
3. Continuing education
4. Programmed courses should be available to students and practicing physicians for review of post-graduate education.
5. Should be instituted in other fields of medicine.

E. What techniques of presenting information have you found valuable for learning while in medical school? (five most common comments)

1. Experience, i.e., conferences and rounds
2. Text books
3. Lantern slide lectures
4. None better than programmed learning
5. Case Presentations

H. List other medical subjects that might be programmed. (10 most often listed out of over 50 mentioned)

1. Biochemistry
2. Physiology
3. Microbiology
4. Pathology
5. Pharmacology
6. Medicine
7. Pediatrics
8. Cardiology
9. Endocrinology
10. Obstetrics

B. Attitude Toward "Applications" Text. A sample of the attitudes toward the "applications" text are shown in Table XXVIII. For a complete survey summary see Appendix P.

C. Summary of Attitude Surveys. The reaction of nearly all students towards both programmed texts was strongly favorable. Negative comments were infrequent, demonstrated no consistent trend, and were often contradictory.

TABLE XXVIII

SAMPLE OF ATTITUDE SURVEY ITEMS - "APPLICATIONS" TEXT

(Items #1, 4, 5) (Total N = 42)

1. Compared to the linear program, I find the case presentations to be

1.	Completely acceptable	15 *
2.	Acceptable	22
3.	All right	4
4.	Unacceptable	0
5.	Completely unacceptable	0

4. In teaching me to apply my knowledge to my patients this program, I expect, will be

1.	Most valuable	11
2.	Valuable	25
3.	All right	3
4.	Of little help	0
5.	Of no help	0

5. If this text were available in a bookstore, I would recommend that others:

1.	Buy it and use it frequently	16
2.	Buy it and use it occasionally	20
3.	Borrow but don't buy it	4
4.	Accept it as a gift only	0
5.	Avoid it completely	0

*Number of students making this choice.

CHAPTER SIX

INTERPRETATION OF DATA

I. Relevance of Teaching Goals to Measurements.

Measurements of the effectiveness of a teaching method are meaningful only to the extent that the goals or objectives of the methods encompass the goals or objectives of the testing methods. If, for example, the teaching methods in this project were devoted chiefly to the diagnosis, evaluation, and treatment of carcinoma of the cervix, and the testing methods emphasized instead, the differential diagnosis of ovarian tumors, to the neglect of carcinoma of the cervix, it could be anticipated that the data from the testing methods would indicate that the teaching methods were relatively ineffective. An accurate description of the results of such a testing program would be that the teaching program, devoted to the diagnosis and treatment of carcinoma of the cervix, was relatively ineffective in teaching the differential diagnosis of ovarian tumors, and that the effectiveness of the teaching of carcinoma of the cervix was not adequately appraised.

In many phases of this project, there were discrepancies between the teaching goals and the testing goals. These discrepancies, varying in kind and degree, are important in interpreting the results of the various testing programs as measurements of teaching effectiveness.

A. Explicit Goals of Teaching Methods. The "Requirements of Course," (Appendix H) an outline of the content of the teaching program of the project, was prepared by the faculty of the Department of Obstetrics and Gynecology in an attempt to express its teaching goals in behavioral terms. The goals were expressed, however, without regard to the restrictions imposed by time, by the limited availability of facilities and patients, and personal limitations of the students and the faculty. The "Requirements of Course" describes a level of knowledge which is approached, but may not be achieved, by resident physicians in obstetrics and gynecology after months or years of specialized training (at least three years beyond the junior student level). Although exceptionally gifted medical students could possibly reach such levels of competence in a few weeks of clinical clerkship, the explicitly stated goals of the "Requirements" are unrealistic as representations of the content of the formal teaching and testing programs for the average student.

B. Inherent Shortcomings of Teaching Methods. All three of the teaching methods used in this project (lectures, "content" programmed text, and "composite" programmed text) were intended to meet the teaching goals of the "Requirements of Course." For none of these methods was it possible to measure directly the extent to which it achieved the stated teaching goals. The shortcomings of each method were related to the limitations of instructional time and to the unsuitability of the teaching medium to the subject matter.

1. The lectures. The lectures attempted to present in a didactic manner the "content" of the "Requirements of Course." They emphasized the importance of the correlation and "application" of this content to the problems of caring for individual patients. The lecturer left the student to do his own correlating and applying of this information in patient care on the wards and in the clinics.
2. The "content" text. This text had essentially the same teaching goals as did the lecture method. Each method of teaching was unable to give the student supervised experience in the application of "content" information to specific problems of patient care.

3. *The "composite" text.* The "application" text (used in conjunction with the "content" text) attempted to do equal justice to both the "content" and "application" aspects of the goals expressed in the "Requirements of Course." The text, unlike the "requirements," was written with strict regard to the time available to students for studying this subject. This time limitation required that the number, variety, and length of cases be restricted to the extent that students were not given adequate drill to achieve the degree of competence specified in the "Requirements of Course."

C. *Implied Goals of Criterion Measures.*

1. *The written "content" Examinations in OB-GYN Neoplasms of the National Board of Medical Examiners.* An inspection of the items in these special National Board Examinations in OB-GYN Neoplasms had confirmed that most of the questions are for "content" information of the kind which characteristically is presented to students in didactic lectures or in standard textbooks of gynecology. The special "content" examinations represented nearly all of the National Board's pool of questions in obstetrical and gynecological neoplasms. The 216 items were distributed into Tests A and C and Tests B and D as follows:

Category	Number of Items	
	Forms A & C	Forms B & D
Ovary and Tube	30	25
Sarcomas of uterus	4	3
Fibroids of uterus	6	5
Endometriosis	17	13
Endometrium	12	10
Endometrium and Cervix	10	12
Cervix	13	27
Vagina-Vulva	11	8
Choriocarcinoma	5	5
	108	108

The teaching materials for the project were developed with no attempt to match, category for category, the content or the emphasis of questions in the special National Board Examinations in OB-GYN Neoplasms. In fact, one category represented on the examinations, choriocarcinoma, was deliberately excluded. A comparison of the "content" of the examinations, question by question, with the content of the linear text, frame by frame, indicates that the examinations covered about 10% of the material presented in the text, with many disparities of emphasis. Since even the text fell far short of the goals of the "Requirements of Course," it is apparent that the gap between what was tested for by the examinations and the explicit teaching goals of the faculty was a very wide gap indeed. The shortcomings of the lecture series and the "content" text and the shortcomings of the special National Board Examinations in OB-GYN Neoplasms were well-matched in kind if not in degree. The examinations may be considered as appropriate measures of the effectiveness of these two teaching methods, provided one accepts these limited goals.

2. The oral examinations. The purpose of the oral examinations, to measure the "application" of content knowledge to specific problems of patient care, is referred to in the "Requirements of Course" only by implication. The judges of the oral examinations had to decide for themselves, without objective guidelines, not only what student responses represented "appropriate management" of the patient, but also whether the responses, appropriate or inappropriate, were to be classified as "content" or "application." The judges could disagree over the appropriateness of the behavior the student exhibited, as well as over its classification. Fortunately, the examiners shared similar viewpoints as experienced teachers trained in the same specialty, and were in apparent agreement most of the time, but what they agreed on was never specified.

3. The written problem-solving tests designed to test "application." These tests were detailed examples of "application" and demanded from the student specific skills which were not defined in the "Requirements of Course." They called for a knowledge of "content," and a degree of skill in its application that exceeded the capabilities of some resident physicians and faculty members, and most students. The tests identified competency in expert performance, but were defective in identifying the kinds and degrees of incompetency exhibited in most other performances. In measuring a few specific skills, the tests exceeded the explicit demands of the "Requirements of Course."

4. Summary of criterion goals.

   a. The special National Board Examinations in OB-GYN Neoplasms were appropriate criterion measures of the teaching of "content" as defined in this project. They were inadequate, however, in their representation of the teaching goals of the project as set forth by the faculty in the "Requirements of Course."

   b. The methods used to teach and test for skill in "application" represented a much closer approach to the teaching goals of the "Requirements of Course" than did the "content" methods. Unfortunately, the testing methods for "application" (the oral examinations and the clinical problem-solving tests), contained procedural flaws which limited their value as measuring devices.

II. Subjective Estimates of Teaching Effectiveness.

A. Faculty Opinions of Teaching Methods.

1. The lecture series. There was general agreement among faculty members who monitored parts of the lecture series or listened to tapes recorded during the series that the lectures were of outstanding quality with appropriate and well-used visual aids.

2. The programmed texts.

   a. The "content" text. No questionnaire was submitted to the faculty members in the departments of obstetrics and gynecology using this text, but verbal comments have been received from faculty members in most of the schools using the text. In general, they inspected the text and found it unimpressive. It is described as skimpy in the coverage of subject matter, not always accurate, often confusing, excessive in the demands it makes of students, dull, repetitious, and requiring an unnecessary amount of writing. In their opinion, most textbooks would be more readable, lively, and authoritative.

   b. The "composite" text. Faculty members did not recognize the "composite" text as such. Most of them could complete all cases in the "applications" text without resorting to the "content" text at all. Faculty members who reviewed the "applications" text seemed to consider it a significant advance in student teaching. They recognized it as a text which gives the student experience in responsible decision making of a nature that is otherwise not available to him as an undergraduate medical student.

3. Testing methods. Faculty members who subscribed, even in a general way, to the principles set forth in the "Requirements of Course" were apt to dismiss the data from testing using the special National Board Examinations in OB-GYN Neoplasms with remarks such as, "The experimental plan may be sound, and the results of the examinations may be valid, but the examinations do not test what we really try to teach." There was a recognition that their own testing tended to remain "content-oriented," and that there was difficulty in interpreting the results of examinations with an "application" orientation. Even the oral examinations in this

project tended to begin with case presentations to test "application" and end with conventional questions on "content." Many faculty members believed that only in real-life situations could one teach or test for "application."

B. Student Opinions.

1. The lectures. With regard to the lectures, student opinions were sharply divided. The majority opinion was that the lectures were well-organized, well-delivered, and presented an excellent coverage of subject matter. The minority opinion was that the lectures were "worthless" because almost everything the lecturer said could be learned from reading a textbook.

2. The programmed texts. There seemed to be a consensus among the students in the project that the introduction of the programmed texts was an improvement in the teaching program which would facilitate learning. There was a minority opinion that conventional methods of teaching permitted more efficient use of the students' time.

C. Evaluation of Subjective Opinions.

1. Faculty opinions. It would appear that the adverse judgment of the faculty members with regard to the "content" text is based upon their observation that it falls short of their teaching goals rather than on their estimate of its effectiveness in attaining more limited goals. Their favorable opinion of the case presentation text appears to be based on its face validity. The cases seem to teach many of the goals which are not covered by other educational media, including the "content" programmed text. But with regard to teaching effectiveness, it has been well established in other studies that subject-matter experts, whether or not they are also programming experts, are poor judges of the teaching

effectiveness of programmed materials in their own fields of competence. The opinions in this study are probably no exception.

2. Student opinions. The student opinions as to the teaching effectiveness of the programmed texts have remained favorable in spite of a generally negative faculty attitude. The student opinions, however, are valuable only as expressions of attitude.

III. Objective Estimates of Teaching Effectiveness.

A. Lectures versus "Content" Text.

1. Learning of "content," immediate achievement.

a. Experimental plan. Throughout the project, a classic pre-test-post-test pattern was followed. In only one of the six schools participating in the project was there a significant difference between experimental and control groups in their pre-test scores. In this one school (The University of North Carolina) the difference favored the control group. In the six schools participating in the study, only one had a known bias in its division of students into control and experimental groups. This one school (The Medical College of Georgia) biased its samples on the basis of previous academic performance in favor of control groups. This bias, however, did not appear in the pre-test scores. Probably in all the schools there were occasional differences in treatment between experimental and control groups which were not called for in the experimental design of the project. None of these, however, have been apparent.

b. Tests. The measure of effectiveness of immediate achievement of learning of "content" was the gain score of the post-test over the pre-test scores on the special examinations in gynecologic neoplasms of the National Board of Medical Examiners.

These tests had high reliability. Each question in these examinations had been shown to be a consistent performer in nationwide testing. There was a remarkable uniformity of results in the mean pre-test and post-test scores of the various experimental and control groups in the project.

These tests had good face validity. There seems little question that the tests were adequate measures of portions of the body of knowledge taught in this project.

c. Evaluation. For the five medical schools in which the "content" programmed text was compared with the schools' conventional method of teaching, the immediate achievement of learning for those in the experimental groups was significantly higher than that of students in the control groups as measured by the special National Board Examinations in OB-GYN Neoplasms. There were no exceptions to this pattern. At the Medical College of Georgia, where control groups were given a specially prepared series of lectures of the highest quality possible, there was no significant difference between experimental and control groups in the immediate achievement of learning of "content." The data in this project justify the conclusion that the "content" text has a teaching effectiveness for junior medical students which is usually superior to conventional classroom instruction.

2. "Retention" of learning of "content." This was measured only at the Medical College of Georgia. The measure of retention was the difference in the scores in Category 11 (Neoplasms) of comprehensive examinations in Obstetrics and Gynecology of the National Board of Medical Examiners, Part II, administered to students at the end of their junior year and again at the end of their senior year.

a. Experimental plan. In this phase of the project, the experimental plan, in retrospect, was clearly defective.

   i. The students who took the tests as juniors in May 1964 were divided into control and experimental groups. The control groups who received lectures in the first and fourth quarters of the academic year had lecture notes to study right up to the time of the examination. Experimental students, who had no lecture notes, had been deprived of their programmed texts from 9 to 18 weeks previously. The collection of the programmed texts from the students was necessary to prevent the texts from falling into the hands of control students. But it also deprived experimental students of written materials to study prior to the final examination. Whether experimental students made use of control students' lecture notes is unknown. Nevertheless, the experimental plan at the end of the junior year in 1964 was unbalanced, and compared retention over a 9 to 18 week interval for the experimental students against relearning from lecture notes (after an interval of from 1 to 27 weeks from the lectures themselves) for the control students.

   ii. In May 1965, when another version of the test was administered to the same students as graduating seniors, the imbalance in the experimental design persisted. Experimental students had no written materials other than standard textbooks to study. Control groups had their lecture notes still available to them. Although all students were advised not to study for this examination, it was not determined whether or not they heeded this advice.

iii. __Summary__. The experimental plan for measuring retention was defective in several ways:

(a). There was a failure to recognize that control students learned and relearned from lecture notes as well as from the lectures themselves.

(b). There was a failure to recognize that experimental students who had completed the programmed text could relearn rapidly from their own text or could borrow a copy if they were sufficiently motivated.

(c). There was a failure to recognize that students who had completed the programmed text differed from control students who had not used the text in their motivation for this review from the programmed text.

(d). For three-fourths of each class (all but the last quarter), the "immediate" post-test at the end of the academic year was in itself a measure of retention (__and relearning__) administered 9 to 27 weeks after completion of the course of instruction. Probably, the most rapid decline in proficiency occurred during the first nine-week interval. The "delayed" post-test, administered a year later, measured a more gradual decline, and this decline was influenced by uncontrolled relearning by both control and experimental groups.

(e). It was unfortunate that the operational plan of the project required the collection of the programmed texts from the students at the end of the instructional period. In ordinary medical school courses, it would be unthinkable for a teacher to confiscate textbooks, workbooks, or lecture notes from his students! In retrospect, all students should have been permitted to retain their learning materials, whether programmed or not, and the objective of measuring "retention" should have been replaced by a more realistic one: measuring "retention - plus relearning."

b. Tests. In each comprehensive National Board Examination in Obstetrics and Gynecology, Part II, the neoplasms category comprised about 40 questions. In the measurement of retention, the performance of the control groups A and A' was compared with the performance of the experimental groups B and B' using the same questions. For the four groups of over 90 students, 40 questions probably represented an adequate sample of "content" knowledge.

c. Summary.

   i. The "content" programmed text produced a "retention" of learning which was slightly superior to that of conventional instruction.

   ii. "Retention," as measured in this study, included uncontrolled and unmeasured opportunities for relearning.

   iii. The potential of the programmed text, once completed by the student, to facilitate rapid relearning was not recognized early enough in the project to be studied or evaluated.

B. "Composite" Text versus "Content" Text. The "composite" text (consisting of the "applications" text used in conjunction with the "content" text) was compared with the "content" text used alone in studies conducted at the Medical College of Georgia in the second year of the project. Measurements were made of the immediate achievement of learning of "content" and immediate achievement of learning of "application."

1. Achievement of learning of "content."
   a. Experimental plan. In this phase of the project, the same experimental plan and the same special National Board Examinations in OB-GYN Neoplasms were used to compare the effectiveness of the "composite" text with the "content" text as had been used in the previous year to compare the "content" text with conventional teaching.
   b. Evaluation. The test results indicate that the "composite" text was equally effective in teaching "content" as the "content" text was when used alone. Since the composite text was not designed to improve the teaching of "content" over that of the "content" text alone, the results of this phase of the testing were the anticipated ones.
2. Achievement of learning of "application." The central purpose of the entire research project was to measure the effectiveness of the "composite" text in teaching the "application" of "content" knowledge to individual problems of patient care. This was the crucial issue in the project, compared with which all the other successes and failures were of secondary importance. Measurements of effectiveness of learning of "application" were by oral examinations, and written tests.
   a. Oral Examinations.
      i. Experimental plan for oral examinations. Examinations were conducted twice yearly, during a week in January and a week in May. During each examining week, students serving in the current and the preceding clerkships in obstetrics and gynecology were presented to the examiners in scrambled order. For some students, the examination represented a measure of immediate achievement of learning; for others, the examination represented a measure of retention of learning after an eight-week

interval during which time the student had devoted his energies to learning another discipline (general surgery). The ABB'A' sequence of the clerkships was designed to produce a balanced experiment. At the first examination session in January, retention of learning of students in the control group after an eight-week interval was compared against the immediate achievement of learning of the students in the experimental group. In the May examination, the relationships were reversed and retention of learning of students in the experimental group was compared to immediate learning of students in the control group. In the second year of the project, this pattern was repeated.

ii. Faults in the design. There were two defects in the experimental design, both of which favored the control groups.

(a). Sampling bias favoring controls. In each year of the project, students of borderline academic status had been excluded from the second control group serving at the end of the year.

(b). Treatment bias. Students in control groups in the first year of the project had lecture notes which they could review at any time up to the examination. It may be assumed that for the first control group the oral examinations were a measure not just of retention over an eight-week period but also of relearning from lecture notes. In contrast, their counterpart experimental group, examined in the latter half of the year, had been deprived of their programmed texts eight weeks before the examination. Since few of these students had notes to review, the examination represented "retention" without relearning.

In the second year of the project, all students received the "content" text at the beginning of the clerkship. Students in experimental groups received the "applications" text in addition. Students in the control group serving in the first quarter of the academic year turned in their "content" programmed texts a week before the oral examinations. Students in the other control group, serving in the last quarter, turned in their programmed texts after the oral examinations, at the time of the final written examination at the end of the academic year. Experimental students serving in the second quarter had been deprived of the programmed texts at the time of the oral examinations. Experimental students serving in the third quarter had been deprived of the "applications" text at the end of the quarter, but turned in the "content" texts much later, at the end of the academic year. At the conclusion of the final written examination, students in the experimental group, all of whom had completed the clerkship nine weeks previously, were asked to what extent they had reviewed or studied the "content" text in the intervening nine weeks in preparation for either the oral examinations or the written final. This information is shown in the first column of Table XXIX.

In every instance the students did their relearning after the oral examinations, in preparation for the written final examination. Thus, the treatment bias, permitting students to retain their "content" texts can be assumed to

TABLE XXIX

THE RELEARNING STUDY TIME OF STUDENTS IN THE SECOND EXPERIMENTAL GROUP B'. COMPARISONS OF THIS GROUP WITH THE FIRST EXPERIMENTAL GROUP B, ON NATIONAL BOARD, PART II, STANDARD SCORES, SPECIAL NATIONAL BOARD EXAMINATIONS IN OB-GYN NEOPLASMS RAW SCORES; and ORAL EXAMINATION SCORES
1964-65

	HOURS STUDY TO RELEARN AFTER CLERKSHIP	SCORES ON NBME PART II MAY 1965	SCORES ON * POST TEST TAKEN AT END OF CLERKSHIP	SCORES ON ORAL EXAMS TAKEN AT END OF CLERKSHIP
Experimental B'				
SUMMATION	30.3	1353	1917	52
N	23	23	23	23
AVERAGE	1.3	80.6	83.3	2.26
RANGE	0-4	72-91	64-97	0-4
Experimental B				
SUMMATION	No Data (Books officially unavailable to students)	1972	2063	56
N		24	24	24
AVERAGE		82.2	86.0	2.33
RANGE		75-96	69-101	1-4

*Special National Board Examination in OB-GYN Neoplasms

*Both groups had books until end of clerkship. These data are given to show that group B was apparently superior to Group B' have had no affect on the oral examination scores. Similar information from their counterpart group in the balanced design, the first control group, is less complete, but interviews with some students from this group suggest that they made little or no effort to review borrowed copies of the text in preparation for the oral examinations.

iii. Reliability of oral examinations. The experimental design of the project did not permit direct measurements of the reliability of oral examinations. Each student received only one half-hour examination in "applications" of "gynecologic oncology" by the team of visiting examiners. Within a week or two of this examination, however, each student was subjected to other oral examinations by teams of faculty members of the department of obstetrics and gynecology of the Medical College of Georgia. These examinations dealt with other phases of obstetrics and gynecology, and the format and scoring system were similar to that used by the visiting examiners. The oral examinations, both "project" and "departmental," followed a similar pattern. The two members of each examining team tended to agree rather closely in their evaluation of a given student's performance in an oral examination. Different teams evaluating different performances by this student, however, disagreed to an amazing degree. Individual student scores on all oral examinations in obstetrics and gynecology by visiting examiners and by departmental examiners are shown in Appendix Q. They tend to confirm the notorious variation among oral examinations in measuring the competence of individual students. They leave unsettled the question of whether the evaluation of a single examining team can be considered reliable or not.

iv. Validity of oral examinations (or "What was tested?"). A review of taped interviews suggests that the oral examinations tended to conform to a pattern:

(a). The student would be presented with a problem case. He would be asked either to request further information or else to proceed to outline his plan of management up to the point where he needed further information. A dialogue would then proceed with exchanges of information between the examiners and the student. As long as the topic under discussion was the management of a particular patient, the interview could be considered as an appropriate test of "application."

(b). If the student failed this test of "application" and mismanaged the patient, he would be presented with a new case presentation and the exchange of information between the examiners and the student would again take place. After each mismanagement, he would be presented with new or altered case presentations, and the interview would continue in this fashion until the end of the examining period.

(c). If the student passed the test and managed the patient to the examiners' satisfaction, he might be given additional problems to manage by exchange of information with his examiners. Often, however, the examiners, once satisfied that this student was adept at "application" and that he could develop appropriate managements for patients which other students mishandled, turned from evaluation of "application" to evaluation of the student. Questions tended to be related to "content" and often were to see how widely the student had read in the literature of gynecologic oncology.

v. Interpretation of results of oral examinations. The oral examinations as measures of "application" were contaminated to varying degrees with "content" testing. For some students, the oral examination was very nearly a pure test of "application." For the majority, the examination was a mixture, in varying degrees, of "content" and "application" testing. There was a tendency for students who performed well in "application" to be subjected to more stringent "content" testing than students who performed poorly in "application." This tendency of the examining team to shift toward "content" testing when faced with a student who showed superior skill in "application" made it unlikely that the superior skill in "application" would survive to be represented in the student's "final pooled grade" unless the student also had a superior knowledge of "content."

The evaluation of the judges was tantamount to a judgment of the student's general competence in gynecologic oncology rather than a test of skill in "application" alone.

The ratings were made on a 5-point scale, but since the extremes of this scale were seldom used, the oral examinations in effect divided students into three categories:

(a). The less competent.

(b). The competent.

(c). The more than competent.

As has been shown, the division of students into control and experimental groups was made on the basis of previous academic performance, with a bias favoring control groups. A testing procedure which tended to measure general competence rather than specific skills would be unlikely to disclose striking differences between the groups being compared. Furthermore, it has been shown that the achievement of learning of "content" for all experimental and control groups at the Medical College of Georgia in both years of the project was essentially the same. Differences in skill in "application" between control and experimental groups might well have existed, and yet have been so camouflaged by similarities in knowledge of "content" between groups that they would not show up in the oral examination grades.

vi. Evaluation of oral examinations. The fact that in the first year of the project there was no significant difference in the oral examination grades between control and experimental groups, neither of whom had been taught "application" specifically, was to be expected. In view of the relative insensitiveness of the oral examinations in measuring skill in "application," it is possible that the observed difference in the second year of the project, significant only at the 10% level, under-represents the difference in "application" skills.

b. Written tests.

i. Experimental plan for written tests. The experimental plan for administering the clinical problem-solving tests was similar to that of the special National Board Examinations in OB-GYN Neoplasms. It called for pre-tests at the beginning of each clerkship and post-tests at the end. Parts of this testing program were discarded for reasons which have already been discussed. The "pre-tests," for example, although planned as measures of the student's entering repertory of "application" skills, were so far beyond the student's level of competence that they had to be abandoned as measuring devices and were retained only to familiarize the student with the format of the tests.

ii. Written post-tests: Diagnostic Process. In four of the five post-tests only the "diagnostic process" sections were scored.

These diagnostic sections, taken together, comprised nearly 400 items of clinical information which students could select or bypass. In these sections of the tests the performance of students in control and experimental groups was compared to the performance of a criterion group of senior resident physicians in obstetrics and gynecology. The data for these four tests are consistent: The experimental groups came closer than did the control groups to emulating the performance of the criterion group; the experimental group was consistently more thorough; it selected more "routine" or screening items, more "indicated" or essential items than did the control group. Taking all the "routine" and "indicated" items together, the difference in Diagnostic Process performance of the experimental groups is significant at the 5% level of confidence. This difference can be reasonably explained as an effect of the "composite" text on students in the experimental group in teaching them increased thoroughness in their diagnostic workups. There was no significant difference between experimental and control groups in their avoidance of useless and contraindicated diagnostic items. This result was to be expected as the case presentations in the "applications" text did not attempt to identify for the student which diagnostic items were "useless" or "contraindicated." In the summer of 1965, after the completion of the study, revisions were made in the "applications" text to help the student recognize the inappropriate diagnostic items in each case.

iii. Written post-tests: Therapeutic Product. Of the five clinical problem-solving post-tests, only one was designed as an extended test of the student's therapeutic judgment in selecting solutions for a series of complex clinical problems.

This test (Problem B) was scored with the help of criterion groups of senior resident physicians in obstetrics and gynecology. In this test, the difference in mean scores between the experimental and the control groups favored the experimental groups and was significant at the 1% level of confidence. Again, it seems reasonable to attribute this improved performance in patient management to an effect of the "applications" text in teaching the experimental group improved skills in the application of "content" knowledge.

iv. Summary of "application" testing.

(a). The oral examinations suggest, but fail to prove beyond the 10% level of confidence, that the "composite text" was more effective than the "content" text in teaching skill in the "application" of content knowledge to individual problems of patient care. Defects in the experimental design of the project and in the examinations themselves introduced a number of uncontrolled and unmeasured variables. In general, however, the defects tended to minimize or obscure differences in "application" skills.

(b). The written examinations were limited in scope and measured specific "application" skills. In the specific problems covered by the tests the data indicate that experimental students demonstrated significantly greater skills in patient management, both in the collection of diagnostic information and in the formulation of a plan of therapy, than did the control students.

IV. Studies of Teaching Efficiency.

A. Time as a Factor. The efficiency of a teaching method varies inversely with the study time required for students to reach a given level of criterion performance. Estimates of the efficiency of a teaching method are no more valid than the time-to-criterion records upon which they are based.

B. Validity of Time Records. The following observations, made at the Medical College of Georgia, reflect upon the validity of these records.

1. A minority of students attempted to turn in totally blank time records at the end of the course. These incomplete forms were returned immediately to the students for completion and invariably were handed in complete, in every detail, a few minutes later. Such records represented no more than retrospective guesswork, and were certainly less accurate than records which other students maintained on a daily basis. The last-minute records, however, could not be distinguished from similar-appearing records which were handed in completed, but may have been filled in only a few minutes or days earlier, rather than throughout the clerkship.
2. A minority of students, especially those in control groups, failed to restrict their recording of study time to the subject matter of gynecologic oncology. They included in their record all the time they spent reading, attending conferences, lectures, and seminars in all topics during the clerkship, and thus produced study-time figures as much as ten times greater than the average for their group. Such records could be revised only by the erring students themselves at a later date. Some of these students seemed never to have grasped the meaning of "oncology" or "neoplasms" or "tumors" and insisted on including in their records many hours spent studying irrelevant subjects, and even their revisions perpetuated curricular impossibilities. For example, some students listed many more hours attending lectures in gynecologic oncology than were available to them during their clerkship.

3. The control groups' records of the time spent reading in gynecologic oncology sometimes included time spent re-reading the same material. Students in experimental groups kept a frame-by-frame record of their hours spent working through the programmed text the first time, but kept no systematic record of hours spent reviewing or relearning from the text. Thus with regard to relearning or review time, the control and experimental groups' records were not directly comparable.
4. Certain students who failed to keep objective records during the clerkship may have arrived at their final figures not by independent estimates of their own effort but by collusion with similarly delinquent colleagues.

C. Problems with Time Records at Other Medical Schools. Nearly all students in the other medical schools participating in the project turned in completed time records, the data from which were analyzed at the Medical College of Georgia. Although no observations were received which would reflect upon the correctness of the data obtained in other schools, one may assume that procedural problems were encountered similar to those at the Medical College of Georgia. For example, some students recorded that they had attended many more hours of classes in gynecologic oncology than were offered to them at their school.

D. Adjustment of Raw Data from Time Records. Every effort was made not to tamper with the time records of students. It was felt that the students' records should be accepted at their face value and that the correction of "errors" could only be accomplished at the risk of increasing the bias of the data. In the end, however, the following corrections were made uniformly on all time records.

1. For control groups, the maximum hours attending lectures or seminars in gynecologic oncology was set at the hours they actually attended the lectures, if a roll call was taken, or at the hours stated up to the maximum number of hours of instruction available to them, when no roll call was taken.

2. Arithmetical errors were corrected. It was assumed that when a discrepancy existed between a student's final totals and his day-to-day or week-by-week records, the latter were more reliable and his arithmetic should be corrected accordingly.
3. Students at the Medical College of Georgia in both control and experimental groups whose time estimates were considered extraordinarily high were asked to make sure that their estimates were restricted to the field of gynecologic oncology, and to make such corrections in their records as they considered appropriate. If they made no corrections, their records were accepted unchanged.

E. Summary of Efficiency Data. At the Medical College of Georgia, in both years of the project, control and experimental groups reached approximately the same level of performance on the special National Board Examinations in OB-GYN Neoplasms learning under conditions which permitted direct comparisons of study times. In the five other Medical Colleges, experimental groups reached a higher level of criterion performance under conditions which did not permit a direct comparison of study times. The following conclusions seem justified:

1. For medical school classes taken as a whole, the "content" programmed text was comparable in efficiency to conventional methods of instruction. For large segments within each class the programmed text was somewhat more efficient than conventional instruction.
2. The use of the "content" programmed text permitted a saving of faculty time equivalent to preparing and presenting the entire course of conventional instruction. This saving was achieved with no apparent adverse effect on the students.
3. The efficiency of the "composite" text in teaching "content" was comparable to that of the "content" text alone.

4. Study time for the "composite" text averaged 24 hours (15 for "content" and 9 for "application"); no comparable information was available from control groups of their time spent studying "application" *per se*. but their study time on the "content" text averaged just over 18 hours. At present, therefore, the relative efficiency of the "composite" text in meeting its teaching objectives is unknown.

CHAPTER SEVEN

PRINCIPAL CONTRIBUTIONS OF PROJECT

I. Development of Programming Methods.

An efficient method has been developed and demonstrated for preparing programmed instruction materials using a team of medical school faculty members and students as writers, editors, and critics. One person, specifically trained in the technology of programmed instruction, worked with the team, but did none of the actual writing and progressively reduced her importance to the team as a catalyst. These techniques have already been shown to be readily adaptable to other situations requiring the preparatic materials at the graduate level.

II. Effect of the "Content" Text.

The linear text has proven to be an efficient teaching method highly acceptable to nearly all students who used it. The majority considered it a superior method of learning. Its effectiveness as a teaching device probably resulted from requiring the students to develop, as rapidly as possible, an active working vocabulary of gynecologic oncology. The students' early mastery of the vocabulary apparently facilitated their learning not only from the programmed text, but also from other sources, such as conventional reading, conferences, and clinical conversations with colleagues, physicians, and others.

III. Effect of "Composite" Text.

This text has been shown to be effective in teaching the "application" of "content" knowledge to specific individual problems of patient care. This effectiveness in teaching "application" can probably be attributed to requiring the students to make responsible decisions in patient management. Deficiencies of knowledge and errors of judgment and skill are shown to the students by their effects on the patient's well-being. This text, with its sequenced experience in clinical decision making, probably directs the students toward a more clinical orientation, and facilitates their learning from real patients in the wards and clinics.

IV. Effect on Curriculum.

By requiring the faculty to define teaching objectives concretely, this research exposed an unreconciled conflict in the curriculum. The minimum requirements of the faculty for the course, when expressed in behavioral terms, demanded vastly more learning time from most students than could be made available without sacrificing time in other parts of the curriculum. The learning time available to the students, rather than the teaching time offered by the faculty, was found to be of paramount importance in establishing realistic objectives for a course within the medical curriculum.

V. Shortcomings of Evaluation Methods.

The project had the benefit of the best available written and oral examinations to measure the effectiveness of its teaching program. Examinations of similar excellence are widely accepted as measures of the professional competence of candidates for licensure and certification. It was found that the tests used in the project were often inappropriate as measures of the expressed teaching objectives of the faculty and were usually inadequate as measures of essential skills in patient management specifically included in the instructional program. The lack of valid, reliable criterion measures proved to be a major handicap in the preparation, presentation, and evaluation of the teaching programs.

VI. Development of New Tests.

Significant progress has been made in the development of written tests designed to measure skills which older, more orthodox examining methods had often left unmeasured. These tests use flexible formats and have been designed to present and measure a variety of sophisticated clinical skills. Nine such tests, 23 or more pages in length, have been developed. Several are currently in use in evaluating medical students.

VII. Texts Produced.

Three programmed texts have been developed.

1. Essentials of Gynecologic Oncology - 442 pages, 830 frames.
2. Applications of Gynecologic Oncology - 357 pages, 713 frames - 35 cases.
3. Programmed Instruction Methods for Obstetrics and Gynecology, A Text for Teachers - 108 pages.

Earlier chapters in this report have presented detailed information confirming the effectiveness and acceptability of the first of these texts, somewhat less information on the second, and none on the third. All three texts have been well received by the students and teachers who have used them. Adequate field testing of the latter two texts, however, must await the further development and validation of appropriate criterion measures.

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APPENDIX A

SAMPLE FRAMES FROM ESSENTIALS OF GYNECOLOGIC ONCOLOGY

FRAMES 1-18
FRAMES 208-226
FRAMES 600-618
FRAMES 811-828

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(In this space on each of the following pages you will find the information in CAPITALS which is withheld from the text below)

LOWER GENITAL TRACT

Neoplasms of the lower genital tract – that is, the vulva and the vagina, fall into two groups: **Cystic** tumors and __________ tumors. The neoplasms can also be divided into benign and______________ groups. We shall consider the ______________ lesions first, and take up the malignant ones later.

(FRAME 1)

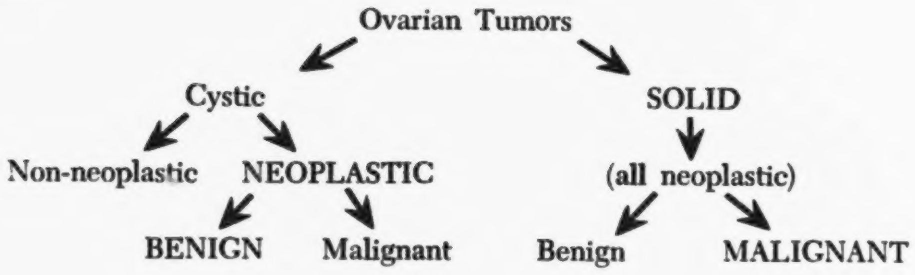
GO ON TO NEXT PAGE →

NO

(Biopsy and histologic study is indicated.)

Exfoliative cytology is for screening, not for diagnosis. Diagnosis requires histopathological examination of excised tissue. Where cancer is suspected by gross examination, a cytology report, if positive, adds nothing to the indications for biopsy already present, and if negative should be __________________.

(FRAME 208)


Ovarian Tumors
Cystic
SOLID
Non-neoplastic
NEOPLASTIC
(all neoplastic)
BENIGN
Malignant
Benign
MALIGNANT

All **solid** ovarian tumors, regardless of the age-group of the patient, are (neoplastic/non-neoplastic). Regardless of whether such ________ tumors prove to be ____________ or malignant, they should be treated by __________ __________.

(FRAME 618)

GO ON TO NEXT PAGE →

Cystic tumors and SOLID tumors

benign and MALIGNANT

the BENIGN lesions

____

Not all the (cystic/solid) (underline one) tumors of the____________

and________________are true **neoplasms.**

Non-________________cysts worth mentioning are:

1. **Inclusion** cysts and
2. Cysts of **embryonic** remnants

(FRAME 2)

GO ON TO NEXT PAGE →

IGNORED or REJECTED

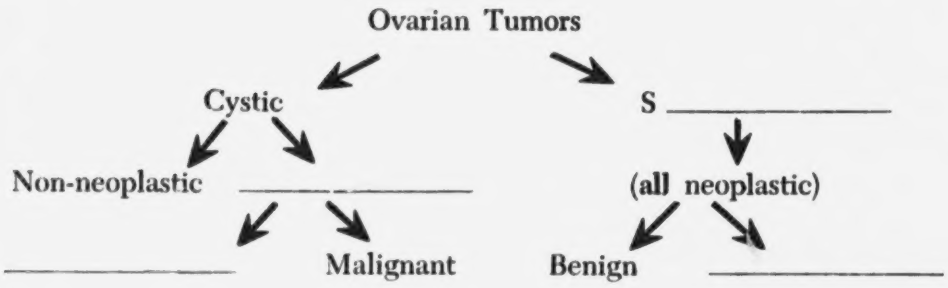
____

Since a Class V Papanicolaou smear is considered conclusive for malignancy, does a Class V smear establish a **diagnosis** of cancer? (Yes/No)

(FRAME 209)

Ovarian tumors: Cystic, solid, benign, malignant

Cysts: Neoplastic and non-NEOPLASTIC


Ovarian Tumors
Cystic
S ____________
Non-neoplastic
____
(all neoplastic)
____
Malignant
Benign
____

(FRAME 617)

GO ON TO NEXT PAGE →

DIAGNOSIS and TREATMENT

If YES, make your own outline.

If NO, make your outline while you review.

This is the end of the program. Please be sure your **time-sheets** are complete; then, if you have time, reread the "Objectives of Course". It may help you to determine which aspects of gynecologic oncology you need to review.

(FRAME 828)

Not all the CYSTIC tumors of the VULVA and VAGINA are true **neoplasms.**

NON-NEOPLASTIC cysts are:

1. **Inclusion** cysts
2. Cysts of **embryonic** remnants

________________cysts of the lower genital tract occur as a result of the burying or **inclusion** of a portion of epithelium in the repair of an episiotomy or ______________(obstetric). They may occur in either the ___________ or the ___________.

(FRAME 3)

GO ON TO NEXT PAGE →

NO

(Cytology is for **screening**, not for diagnosis.)

A Class V vaginal smear indicates that the patient has definite malignant cells in her vaginal secretions. It does not tell you that the cells necessarily came from a fully developed cancer, nor where the cancer is, nor its extent, nor its invasiveness. A **diagnosis** of cancer requires **histologic** confirmation.

Question: Does a Class I Pap smear rule out cancer of the cervix?

____

(FRAME 210)

CLASSIFICATION

AGREE

Ovarian tumors may be solid, cystic, benign, or malignant in any combination. **Cystic** ovarian tumors may be neoplastic or non-__________.

(FRAME 616)

GO ON TO NEXT PAGE →

If YES, do so, and keep your outline for reference

If NO, please make your outline while you review this section on adnexal tumors.

(You can find a complete outline printed in Objectives of Course)

All ovarian tumors, regardless of size or the patient's age, require

__________ and __________.

Can you outline the management of each ovarian tumor? (Yes/No)

(FRAME 827)

INCLUSION cysts occur by **burying** or **inclusion** of epithelium in the repair of an **episiotomy** or obstetric LACERATION. They may occur in the VULVA or the VAGINA.

Inclusion cysts are therefore usually found in (nulliparous/parous) (underline one) women. The cysts are usually small, movable, greyish or yellowish in color, and filled with sebaceous material or desquamated cells. The lining is stratified________________epithelium.

(FRAME 4)

GO ON TO NEXT PAGE →

NO!

Even in the hands of an expert cytopathologist there is a significant **error rate** for each class. Papanicolaou himself reported the following

__________ ________________:

Classes I and II	10%
Class IV	5%
Class V	2%

Other large series have reported a considerably higher error rate (15%) for "false negatives" in Classes __________ and __________.

(FRAME 211)

40 PRIMARY tumors

METASTATIC (from uterus, gastrointestinal tract, breast)

There is no classification of ovarian tumors which satisfies everyone, mostly because experts disagree on the histogenesis of many tumors. Nevertheless, the practical problems of caring for a patient with an ovarian tumor require that you have a working ________________ in mind. The various classifications disagree over details, but in certain fundamentals of management they all ________________.

(FRAME 615)

GO ON TO NEXT PAGE →

(in effect)

BY PERIODIC, REGULAR PELVIC EXAMINATIONS
OF ALL WOMEN

Can you write out, in your own words, a classification of ovarian enlargements (tumors)? (Yes/No)

(FRAME 826)

PAROUS women are most apt to have small inclusion cysts, filled with sebaceous material and lined by stratified SQUAMOUS epithelium.

Considering the etiology of these cysts, what would you suppose the malignant potential to be?__________________

Once the diagnosis is made, what treatment is usually required?

____

(FRAME 5)

GO ON TO NEXT PAGE →

ERROR RATES

I and II

(Note that "false negatives" are far more frequent than "false positives")

The error rate ("false positive") for Class V smears is about ______%.

The error rate ("false positive") for Class IV smears is about ______%.

The error rate ("__________ ______________") for Class I and II smears is about ______%.

(FRAME 212)

SECONDARY, METASTATIC

At least **40** specific (primary/secondary) tumors may arise from ovarian tissue. The ovary also tends to be the recipient of secondary, ________________ tumors, especially ones arising in the uterus, gastrointestinal tract, and breast.

(FRAME 614)

GO ON TO NEXT PAGE →

7. NOT ALL OVARIAN NEOPLASMS ARE CANCER.
8. SOME OVARIAN CANCERS ARE CYSTIC.
9. SOLID OVARIAN TUMORS ARISING AFTER THE MENOPAUSE ARE USUALLY CANCEROUS.

With currently available knowledge (your knowledge), how can the death toll from ovarian cancer best be reduced?

(your words)

____

(FRAME 825)

Malignant potential = NIL

Treatment needed = NONE

(Under some circumstances you might excise or marsupialize the cyst.)

Gartner's duct cysts are cystic dilatations of an emb________ remnant. ________________ duct is a portion of the ________________ or Wolffian duct. The cysts are usually located in the upper ____________, and tend to be large, soft, thin-walled, lined by low cuboidal epithelium and filled with clear serous fluid.

(FRAME 6)

GO ON TO NEXT PAGE →

Class V:	"false positive"	**2%**
Class IV:	"false positive"	**5%**
Classes I and II:	"FALSE NEGATIVE"	**10%** or **15%**

A "false negative" smear in a cancer patient may indicate either:

1. An error in **interpretation** by the cytopathologist
2. An error in **sampling** (collecting the specimen) by the clinician
3. **Failure** of the cancer to exfoliate identifiable cancer cells

Failure to exfoliate identifiable cells is especially apt to occur in cases of (invasive/preinvasive) cancers, where the tumor is separated from the vaginal secretions by a layer of necrotic cells and debris, and thus the smear may show only evidence of an inflammatory process.

(FRAME 213)

(your answer)

1. No treatment (for minimal, or asymptomatic disease)
2. Endocrine therapy (for most symptomatic cases, as a trial)
3. Conservative surgery (for failures of endocrine therapy)
4. Castration (surgery, x-ray) (for severely asymptomatic, intractable cases where all other methods have failed)

OVARIAN TUMORS

The ovary can be the site of an awesome array of important and interesting tumors. No other organ in the human body can equal it in the number and variety of primary and ______________ tumors which can be found in it.

(FRAME 613)

GO ON TO NEXT PAGE →

4. ALL OVARIAN NEOPLASMS SHOULD BE REMOVED.
5. HENCE ALL SOLID OVARIAN TUMORS SHOULD BE REMOVED.
6. **SOME,** BUT NOT ALL CYSTIC OVARIAN TUMORS SHOULD BE REMOVED.

Unscramble:

7. cancer Not all ovarian are neoplasms.

____

8. ovarian cystic are cancers Some.

____

9. Solid ovarian tumors arising after the menopause are usually cancerous.

____

____

(FRAME 824)

Gartner's duct cysts: dilatations of an EMBRYONIC remnant.

GARTNER'S duct: a portion of the MESONEPHRIC or **Wolffian** duct.

The cysts are soft, thin-walled, filled with clear serous fluid and are **usually** located in the upper VAGINA.

The malignant potential of the cyst is almost ________ ______. Treatment, for symptoms of a mechanical nature, consists of surgical ________________, but since these cysts are usually asymptomatic, surgical therapy is ________________ necessary.

(FRAME 7)

GO ON TO NEXT PAGE →

Failure to exfoliate identifiable cancer cells may occur with INVASIVE cancers* (which are often **secondarily infected).**

*Especially invasive **adenocarcinomas** of the cervix

Why should a false negative occur?

Error in ________________________ by cytopathologist

Error in ________________________ by clinician

______________ of the cancer to ______________________ identifiable cells

(FRAME 214)

CASTRATION by destroying OVARIAN function avoids injury to the BOWEL or BLADDER.

List four approaches to the management of endometriosis, and give appropriate indications for each approach.

1. ______________________________

2. ______________________________

3. ______________________________

4. ______________________________

(FRAME 612)

GO ON TO NEXT PAGE →

1. ALL **SOLID** OVARIAN TUMORS ARE NEOPLASTIC.
2. ALL NON-NEOPLASTIC OVARIAN TUMORS ARE CYSTIC.
3. SOME CYSTIC OVARIAN TUMORS ARE NEOPLASTIC.

(also)

3. SOME NEOPLASTIC OVARIAN TUMORS ARE CYSTIC.

Unscramble these:

4. removed should All be ovarian neoplasms.

____

5. removed should Hence all be tumors solid ovarian.

____

6. Some, removed should be all, but not ovarian tumors cystic.

____

(FRAME 823)

Malignant potential = NIL

For symptoms of a mechanical nature (such as dyspareunia) **treatment** consists of surgical REMOVAL, but is SELDOM, RARELY necessary.

How would you identify a Gartner's duct cyst on pelvic examination?

1. consistency? ______________________
2. thickness of wall? ____________________
3. where found? ______________________
4. contents? ______________________

(FRAME 8)

GO ON TO NEXT PAGE →

INTERPRETATION

SAMPLING

FAILURE to EXFOLIATE

We omitted listing an error rate for Class III. What error rate would you predict? ______________

If the smear is reported as "doubtful" or "______________",

what kind of result would be erroneous? ______________

(FRAME 215)

Castration:

By REMOVAL or EXCISION of ovaries or by X-RAY

________ _______

________________ is most useful in patients with extensive, symptomatic involvement of the intestinal or urinary tracts. In such cases simple ablation of _______________ function is a safe means of therapy as compared to major resection of the _____________ or _____________.

(FRAME 611)

GO ON TO NEXT PAGE →

CANCER

NON-NEOPLASTIC

____

Unscramble the following sentences.

1. ovarian neoplastic tumors are **solid** All.

   ____

2. tumors **All** cystic are ovarian non-neoplastic.

   ____

3. ovarian **Some** neoplastic cystic tumors are.

   ____

   ____

(two ways)

(FRAME 822)

1. SOFT
2. THIN-WALLED
3. IN THE UPPER VAGINA (usually)
4. FILLED WITH CLEAR SEROUS FLUID

Another cyst of ________________ remnants is a **cyst of the canal of Nuck** (also called a **vulvar hydrocele**) which is a soft cyst found in the inguinal region lined by serosa and formed by remnants of the **processus** ______________, which in embryonic life accompanies the ________________ligament in the ______________ canal. This is a very (common/rare) cyst.

(FRAME 9)

GO ON TO NEXT PAGE →

NONE

A SUSPICIOUS or "doubtful" smear is neither negative nor positive for malignancy, therefore, neither result would be erroneous.

NONE

Cytopathologists differ in the criteria they use in calling a smear "doubtful", "suspicious", or "Class III". As a result, the incidence of malignancy in patients with Class III smears varies from laboratory to laboratory. As a rule of thumb, however, you can make a working assumption that further diagnostic studies of a patient with a Class III Pap smear have about a 50-50 chance of revealing a ________________.

(FRAME 216)

CASTRATION of the patient removes the stimulus to **ENDOMETRIAL** growth. **OVARIAN** function and **ESTROGEN** are lost.

Castration may be accomplished by simple ____________ of the ovaries, or in patients with such advanced disease as to be inoperable (which is very rare), by ____________-ray therapy.

(FRAME 610)

GO ON TO NEXT PAGE →

Adnexal **NEOPLASMS** should be **REMOVED.**

Postmenopausal tumors are **NEOPLASTIC** and should be **REMOVED.**

Most solid adnexal tumors arising after the menopause are ____________.

Most ovarian cysts under 5 cm. arising during the reproductive years are ____________.

(FRAME 821)

A cyst of the Canal of Nuck is a cyst of:

EMBRYONIC remnants, located in the inguinal region, and formed of serosal remnants of the **processus** VAGINALIS, which in embryonic life accompanies the ROUND ligament in the INGUINAL canal. A RARE cyst.

Thus far, we have considered the following non- ____________ cysts:

1. ______________ cysts
2. Cysts of ______________ ______________
   (a) ______________ duct cyst
   (b) Cyst of the Canal of Nuck or vulvar ______________

(FRAME 10)

GO ON TO NEXT PAGE →

MALIGNANCY or CANCER

From the standpoint of **practical management** of patients, Papanicolaou smears fall into two groups:

1. "Negative" smears, which in themselves do not indicate the need for further diagnostic studies for cancer, and
2. "Positive" and ______________ smears, **all** of which require further diagnostic procedures to establish or rule out the diagnosis of cancer.

(FRAME 217)

For ADENOMYOSIS:
TOTAL HYSTERECTOMY with
CONSERVATION of the ovaries

Radical therapy consists of ______________ of the patient. This cures the disease by removing the stimulus to further ______________ growth. The ______________ function is of course lost, as is also the patient's main source of the important metabolic steroid ______________.

(FRAME 609)

GO ON TO NEXT PAGE →

GRIM

All solid adnexal tumors are ______________ and should be ______________

All adnexal tumors (cystic and solid) arising after the menopause are ______________ and should be ______________.

(FRAME 820)

Non-NEOPLASTIC cysts

(1) INCLUSION cysts

(2) Cysts of EMBRYONIC REMNANTS

  (a) GARTNER'S duct cysts

  (b) Cysts of the Canal of Nuck or vulvar HYDROCELE

The lower genital tract is also the site of **glandular** cysts, some which are neoplastic and some of which aren't. The most common non-neoplastic glandular cyst of the lower genital tract is the **Bartholin** cyst. This cyst results from dilatation of the **duct** of the ________________ gland as a result of distal obstruction of the ________________ of the gland.

(FRAME 11)

GO ON TO NEXT PAGE →

1. "Negative" Classes I and II

2. "Positive" and "SUSPICIOUS" or "DOUBTFUL", Classes III, IV, V

From the standpoint of ________________, though not of prognosis, a Class III smear and a Class V smear are ________________. They both require histopathological study of excised ________________.

(FRAME 218)

Conservative treatment: Total HYSTERECTOMY with

CONSERVATION, PRESERVATION of OVARIAN tissue

For ________________ (intra-uterine endometriosis) when symptoms are sufficient to warrant surgery, ____________ ______________ with ______________ of ovaries is usually the procedure of choice.

(FRAME 608)

GO ON TO NEXT PAGE →

TOTAL HYSTERECTOMY and BILATERAL SALPINGO-OOPHORECTOMY

(In these rare cases who knows whether to do an OMENTECTOMY?)

Since a diagnosis is seldom made early enough for the tumor to be still confined to the tube, prognosis for most patients is ______________.

(FRAME 819)

The most common non-neoplastic cyst of the lower genital tract: the **Bartholin** cyst, caused by dilatation of the duct of the BARTHOLIN (or VULVOVAGINAL) gland as a result of **obstruction** of the DUCT of the gland.

The distal part of the Bartholin duct may become ____________ by scarring due to recurrent infection or blockage by inspissated secretions. In either event, glandular secretion continues, and a ____________ forms.

(FRAME 12)

GO ON TO NEXT PAGE →

In MANAGEMENT, Class III and Class V are IDENTICAL or the SAME. They both require study of TISSUE.

All Pap smears of Classes III, IV, and V indicate the need for ________________ study.

(FRAME 219)

FIBROUS or SCAR tissue

LESS risk

NORMAL tissues

SURGICAL therapy

ENDOCRINE therapy

In some women in whom desire for further childbearing is **not** a consideration, with extensive **uterine** but resectable adnexal involvement, appropriate (conservative) surgical treatment may consist of total ____________ with ____________ of normal ____________ tissue.

(FRAME 607)

GO ON TO NEXT PAGE →

MICROSCOPIC EXAMINATION OF TISSUE

Treatment of operable cases of tubal cancer is the same as for operable cases of ovarian cancer, i.e., ____________ ________________

and ____________ ________________________.

(name the surgical operations of choice)

(FRAME 818)

The **duct** may become OBSTRUCTED (or BLOCKED). Secretion continues and a CYST forms.

The cyst tends to increase slowly in size, and is usually filled with a mucoid, clear or yellowish secretion. Malignant potential of the cyst is almost nil, although _______________ (cell type) -carcinomas arising from the **gland** itself are sometimes reported.

(FRAME 13)

GO ON TO NEXT PAGE →

TISSUE or BIOPSY or HISTOPATHOLOGICAL

Both **normal columnar** epithelium of the endocervix and **abnormal squamous** epithelium in the cervix - i.e.: "new" metaplastic, or dyplastic, or neoplastic (cancerous) epithelia – are deficient in **glycogen.** They therefore fail to stain deeply with _______________. This is the basis of the Schiller test.

(FRAME 220)

PALLIATION

ENDOCRINE therapy

PREOPERATIVE preparation

CONSERVATIVE surgery

Several months of endocrine therapy make the surgery easier, by bringing about softening of adhesions and ______________ tissue surrounding implants, permitting the surgeon to develop planes of cleavage, and thus remove the diseased areas with (more/less) risk of injury to surrounding ______________ tissue and organs.
Thus even when ______________ therapy is planned as the treatment of choice, ______________ therapy may improve the chances of a good result.

(FRAME 606)

GO ON TO NEXT PAGE →

(Inflammatory) **HYDRO-** or **PYO-SALPINX** or **TUBO-OVARIAN ABSCESS**

(Hematosalpinx) **ECTOPIC PREGNANCY**[*]

[*] Hematosalpinx is **almost** pathognomonic of ectopic pregnancy.

Ultimately the diagnosis must be made by:

____

(your words)

(FRAME 817)

Malignant potential: almost nil

ADENOCARCINOMAS are sometimes reported.

The chief complication of a Bartholin cyst is **infection**, with formation of a Bartholin ______________. This occurs so commonly that Bartholin cysts warrant prophylactic treatment.

(FRAME 14)

GO ON TO NEXT PAGE →

IODINE

The Schiller test consists of painting the cervix with an aqueous iodine solution (usually Lugol's) and observing the staining reaction. The test may be used to delineate the following non-staining tissues:

1. (Normal)____________________________ (Neither of these
(Glandular epithelium)
2. (Benign)____________________________ are premalignant)
(Squamous epithelium)
3. (Premalignant)________________________
4. (Malignant)____________________________ (invasive or pre-invasive)

(FRAME 221)

SUSPENSION of uterus

LYSIS of adhesions

EXCISION. DESTRUCTION. REMOVAL of implants

IMPROVED fertility

Improved **FERTILITY**

ENDOCRINE therapy

Neither endocrine nor surgical therapy of endometriosis is usually curative. In most cases, they offer only ______________. Many clinicians have found ______________ therapy most useful in endometriosis as a pre______________ preparation for ______________ surgery.

(FRAME 605)

GO ON TO NEXT PAGE →

Same as **OVARIAN** cancer

Correct diagnosis is **RARELY** made.

At the time of laparotomy the appearance of the unopened tube often suggests an inflammatory lesion, such as ______________ or ______________, or sometimes, the hematosalpinx of an ______________.

(FRAME 816)

ABSCESS

Current surgical treatment of a Bartholin cyst calls for **marsupialization.** A new permanent opening is made between the cyst and the overlying epithelium of the vaginal _______________.
(anatomical part)

(FRAME 15)

GO ON TO NEXT PAGE →

1. (Normal) GLANDULAR or COLUMNAR EPITHELIUM
2. (Benign) SQUAMOUS METAPLASIA
3. (Premalignant) ATYPICAL SQUAMOUS METAPLASIA or DYSPLASIA
4. (Malignant) CANCER (invasive or pre-invasive)

Normal squamous epithelium of the cervix and vagina turns a deep mahogany color when stained with iodine. The Schiller test can be used to identify _______________________ epithelium which need not be biopsied.

(FRAME 222)

EXCISION and/or **FULGURATION** of cysts and implants

Presacral **NEURECTOMY** to **DENERVATE** the uterus

Lysis of **ADHESIONS**

SUSPENSION* of the uterus

* This is the name of the operation.

Uterine ______ and ______ of adhesions, in addition to ______ of implants, results in significantly ______ed fertility postoperatively in patients with endometriosis. In small series of patients, this same improved ______ has also been demonstrated for conservative ______ therapy.

(FRAME 604)

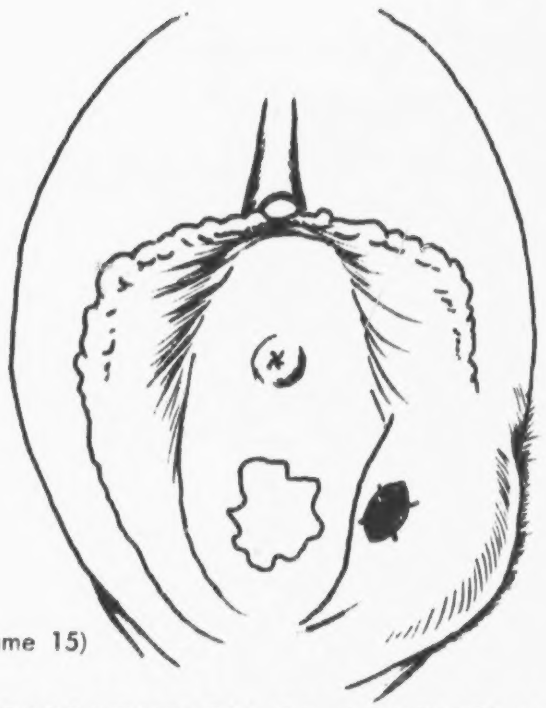
GO ON TO NEXT PAGE →

(in effect)

(continuity)	OVARY, UTERUS
(contiguity)	PELVIC PERITONEUM, SEROSA OF BOWEL AND OMENTUM
(lymphatics)	UTERUS, OPPOSITE TUBE AND OVARY, AORTIC, ILIAC, HYPOGASTRIC NODES
(vascular)	DISTANT ORGANS, LUNGS

Differential diagnosis of tubal cancer, preoperatively, poses all the same diagnostic possibilities as does ______ cancer. Because tubal cancer is such an **unlikely** possibility, a correct preoperative diagnosis is (rarely/frequently) made.

(FRAME 815)



(Figure For Frame 15)

MARSUPIALIZATION OF BARTHOLIN CYST

GO ON TO NEXT PAGE →

The Schiller test identifies NORMAL SQUAMOUS epithelium.

The Schiller test is therefore useful in indicating the margin between the normal squamous epithelium and the ________-staining epithelium, which in an adequate biopsy, should be ________________ in the specimen.

(FRAME 223)

DYSMENORRHEA, division of the
SACRO-UTERINE (or uterosacral) ligaments
PRESACRAL neurectomy

In addition to ____________ and/or ____________ of implants, and presacral ____________ to ____________ the uterus, conservative surgery for endometriosis also commonly includes lysis of ____________ binding down the tubes, and ____________ of the uterus in an anterior position.

(FRAME 603)

GO ON TO NEXT PAGE →

DISTAL end
PELVIC PERITONEUM, OVARY, etc.

The **spread** of tubal cancer resembles that of ovarian cancer

by **continuity to** ________________________
(connected structures)

by **contiguity** to ________________________
(structures in contact)

by **lymphatics** to ________________________
(regional structures and nodes)

by **vacsular system** to ________________________
(name the organs)
(your words)

(FRAME 814)

Marsupialization: a new permanent opening between the cyst and the overlying epithelium of the vaginal VESTIBULE.

The operation permits continued drainage of the cyst contents and of the normal secretions of the ____________. Once______________ is established, the dilated duct soon returns to normal____________.

(FRAME 16)

GO ON TO NEXT PAGE →

NON-staining

INCLUDED or REMOVED (in) or EXCISED (with)

Since invasive cancer usually develops from a pre-invasive cancer, it should be obvious that in many cases the two lesions will ____________ ____________________________.

(FRAME 224)

CONSERVATIVE surgery

RELIEF of pain

IMPROVEMENT of fertility

____

As prolonged though often partial relief for severe dys______________, partial **denervation** of the uterus is often done, either by transection of the sacro-______________ ligaments (Doyle's operation) or else by pre______________ neurectomy, which is the more commonly performed operation.

(FRAME 602)

GO ON TO NEXT PAGE →

EndoSALPINX

BILATERAL in **30%**

____

The tumor grows most commonly near the (distal/proximal) end of the tube, converting it to a fusiform mass, and soon spills through the fimbriated end onto the ____________ ________________.

(FRAME 813)

The marsupializing operation permits drainage of the secretions of the GLAND. Once DRAINAGE is established, the dilated duct soon returns to normal SIZE (or CALIBER).

Because of its simplicity, relative bloodlessness, and effectiveness in restoring normal physiology, the operation of______________________ has (replaced/been replaced by) the older, much less satisfactory procedure of surgical **excision** of the cyst, which was really________________ of the dilated ________________ of the gland.

(FRAME 17)

GO ON TO NEXT PAGE →

COEXIST or BE FOUND TOGETHER.

Invasive cancer frequently is surrounded by a border of________________

____________________cancer.

(FRAME 225)

Conservative therapy may be endocrine or SURGICAL. The CONSERVATIVE approach calls for PRESERVATION, CONSERVATION, of reproductive FUNCTION with removal only of areas of ENDOMETRIOSIS, DISEASE, INVOLVEMENT.

Excision and/or fulguration of cysts and implants is the main objective of ________________ surgery. Other objectives are ____________ of menstrual pain and ________________ of fertility.

(FRAME 601)

GO ON TO NEXT PAGE →

LEAST likely site: OVIDUCT, TUBE

One out of 1,000 pelvic CANCERS

The carcinoma originates as a nodule within the endo____________.

Like cancer of the ovary, cancer of the tube is ________lateral about __________% of the time.

(FRAME 812)

MARSUPIALIZATION has REPLACED the obsolete operation of Bartholin cystectomy, which was really EXCISION of the dilated DUCT of the gland.

Ectopic endometrium may at times be found in the vulva or vagina, forming bluish cystic lesions which tend to enlarge and become painful at the time of the ____________. These cyclic changes are characteristic of ______________. Treatment, when needed, is surgical
(name the disease)

______________, or (sometimes) endocrine therapy with progestational agents.

(FRAME 18)

GO ON TO NEXT PAGE →

PRE-INVASIVE or INTRA-EPITHELIAL

A cervical punch biopsy showing intra-epithelial cancer may represent either:

(1) A true ________________________ lesion, or

(2) The edge of an ____________________ lesion

(FRAME 226)

PSEUDO-PREGNANCY
PROGESTATIONAL
ATROPHY, FIBROSIS
SCAR or FIBROUS

The **conservative** therapy of endometriosis may be endocrine or __________. __________ surgical therapy is directed towards __________ of reproductive __________, with removal only of the areas of __________.

(FRAME 600)

GO ON TO NEXT PAGE →

INSIDIOUS onset

The cure rate is POOR, DISHEARTENING, DISCOURAGING.

PALLIATIVE therapy has much to offer!

(The above applies as well to cancer of the tube as to cancer of the ovary.)

THE TUBE

The only genital organ we have not considered and the portion of th female genital tract (most/least) likely to be the site of primary carcinoma is the __________. Primary adenocarcinoma of this orga occurs only about once out of every 1,000 pelvic __________

(FRAME 81

APPENDIX B

SAMPLE FRAMES FROM APPLICATIONS OF GYNECOLOGIC ONCOLOGY

TWO CASES

from

APPLICATIONS OF GYNECOLOGIC ONCOLOGY

Case #5 = UPPER CASE
Case #14 = LOWER CASE

by

Preston Lea Wilds, M.D. and Virginia Zachert, Ph.D.

Department of Obstetrics and Gynecology
Medical College of Georgia
Augusta, Georgia

October 1965

NOTE: IN THE TEACHING PROGRAM NONE OF THE CONSECUTIVE PAGES FACE EACH OTHER. TO SAVE SPACE IN THIS APPENDIX, THEY ARE PRINTED IN BACK TO BACK FORMAT.

Diagrams and discussion of cases (from the text, Programmed Instruction Methods for Obstetrics and Gynecology, a Text for Teachers) Pages 212-220.

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PLW/VZ:mho

U1

UPPER CASE

A 50-year old married nullipara comes to your office with the complaint of "sore on her privates". She states she first noticed the lesion about two weeks previously. Examination reveals a painless, firm, ulcerated area 2 cm in diameter involving the right half of the clitoris and her adjacent labium minus. Lymph nodes in the inguinal regions are moderately enlarged and not tender. There are no other positive physical findings.

Go on to U 2 for illustration.

U1

L1

LOWER CASE

A 45-year old woman returns to your care after a year's absence complaining of rectal bleeding of a month's duration. Two years previously, while under your care she had received radiation treatment for squamous cell carcinoma of the cervix Stage IIa. Her follow-up for the first year following treatment had been uneventful. She denies any symptoms during the past year except the development during the past month of bright red rectal bleeding mostly with bowel movements. How would you approach the further management of this patient? (Just write down your next step.)

____

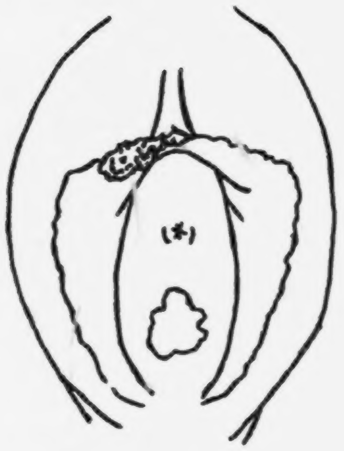
____

____

Write your answer, then turn to L 2.

L1

U 2



Please go to U 3.

From the list below please mark the answer which most closely corresponds to your own, then turn to the LOWER PAGE indicated.

☐ **Review previous records and obtain additional history. L 3**

☐ **Perform a general physical examination. L 4**

☐ **Perform a pelvic and rectal examination. L 5**

☐ **Perform a proctosigmoidoscopy. L 6**

☐ **Order some diagnostic studies. L 7**

☐ **Do none of the listed options. L 8**

Which one of the following would you consider the most appropriate initial management? (Mark your choice, then turn to the UPPER PAGE indicated).

☐ An incisional or punch biopsy of the edge of the lesion. U 6

☐ An incisional or punch biopsy with other tests or studies. U 9

☐ An excisional biopsy of the lesion. U 12

☐ VDRL, Kahn, or equivalent test for syphilis. U 13

☐ Other studies, without biopsy. U 14.

REVIEW PREVIOUS RECORDS AND OBTAIN ADDITIONAL HISTORY

Summary: Patient, a 43-year-old unmarried nullipara had been referred to you two years previously by another physician who in the course of a routine physical examination had noted a cervical lesion and had obtained a punch biopsy which was reported as invasive squamous cell carcinoma. The lesion involved the entire cervix and a small amount of both lateral vaginal fornices and was staged as IIa. After a complete history, general physical exam and the usual workup for a cancer patient, including cystoscopy proctosigmoidoscopy, IVP, barium enema and metastatic survey, all of which was within normal limits a decision was made to treat the patient by radiation therapy. This treatment is summarized on L 10.

PHYSICAL FINDINGS

1.	Unremarkable for adult woman	(I)
2.	Pap smear taken. See Report	(I)
3.	Not enlarged	(I)
4.	Atrophic	(I)
5.	Stenotic, no lesions visible, indurated posterior fornix	(I)
6.	Marital, nulliparous	(I)
7.	Normal size, fixed in vaginal axis	(I)
8.	Atrophic, flush with vault	(I)
9.	Not palpable	(I)
10.	3 cm. granular mass in anterior wall at level of cervix	(I)
11.	Rectovaginal septum thickened in upper part. Parametria soft, pliable	(I)
12.	Intact, no lesions	(I)
13.	Symmetrical, normal	(R)
14.	Grey, normal	(R)
15.	Pupils RRERLA, EOM & fundi normal	(R)
16.	Canals clear, membranes intact	(R)
17.	Unremarkable	(R)
18.	Edentulous, no lesions sl. mucous pallor	(R)
19.	No masses or lesions	(R)
20.	Not enlarged, NSR, no murmurs	(R)
21.	Clear to P & A	(R)
22.	Supple, no masses	(R)
23.	Midline	(R)
24.	Not enlarged	(R)
25.	Undistended	(R)
26.	Flat, radiation skin changes in suprapubic area	(I)
27.	Not felt	(I)
28.	Not felt	(I)
29.	Not elicited	(I)
30.	37.1°, 80, 20, 130/80	(R)
31.	5'6", 140 lbs.	(R)
32.	Adult woman in apparent good health	(R)
33.	No enlarged nodes	(I)
34.	Symmetrical, no abnormalities noted	(R)
35.	Within normal limits	(R)
36.	Well-formed	(R)
37.	Physiologic	(R)
38.	Present and equal	(R)
39.	Radiation changes over sacrum	(R)
40.	Absent	(S)

GENERAL PHYSICAL EXAMINATION

Please check the parts you wish to examine and look up the findings with the corresponding code numbers in the column on the left.

TPR, BP	30( )
Hgt., wgt.	31( )
General Description	32( )
Skin	12( )
Lymphatics	33( )
Head and face	13( )
Hair	14( )
Eyes	15( )
Ears	16( )
Nose	17( )
Mouth, throat, teeth	18( )
Neck	22( )
Trachea	23( )
Thyroid	24( )
Vessels	25( )
Chest	34( )
Breasts & axillae	19( )
Heart	20( )
Lungs	21( )
Abdomen	26( )
LSK	27( )
Masses	28( )
Tenderness	29( )
Pelvic examination	2( )
Hair distribution	1( )
Ext. genitalia	4( )
SUB Glands	3( )
Introitus & perineum	6( )
Vagina	5( )
Cervix	8( )
Uterus	7( )
Adnexa	9( )
Rectal	11( )
Sphincter	12( )
Masses	10( )
Back	39( )
Extremities	36( )
Pulses	38( )
DTRS	37( )
Neurological	35( )

DIRECTORY (your next step)

Old records + history. PAGE L 3
Proctosigmoidoscopy. PAGE L 6
Diagnostic studies. PAGE L 7
Your diagnosis + treatment. PAGE L 11

CODE

I = Indicated, required by presenting problem.
R = Routine, for screening or completeness of evaluation.
U = Probably useless but harmless in this case.
C = Contraindicated, not in the patient's interest.
S = Spurious, bogus answer.

FINDINGS

1. Unremarkable for adult woman (I)
2. Pap smear taken. See report (I)
3. Not enlarged (I)
4. Atrophic (I)
5. Stenotic, no lesions visible, indurated posterior fornix (I)
6. Marital, nulliparous (I)
7. Normal size, fixed in vaginal axis (I)
8. Atrophic, flush with vault (I)
9. Not palpable (I)
10. 3 cm. granular mass in anterior wall at level of cervix (I)
11. Rectovaginal septum thickened in upper part. Parametria soft, pliable. (I)
12. Intact, no lesions (I)

PELVIC & RECTAL EXAMINATION

(same findings in this case when done under general anesthesia)

Check the parts you wish to examine and look up the findings with the corresponding code numbers in the column to the left.

Pelvic examination__________ 2( )
  Hair distribution__________ 1( )
  Ext. genitalia__________ 4( )
  SUB glands__________ 3( )
  Perineum & introitus__________ 6( )
  Vagina__________ 5( )
  Cervix__________ 8( )
  Uterus__________ 7( )
  Adnexa__________ 9( )

Rectal__________ 11( )
  Sphincter__________ 12( )
  Masses__________ 10( )

DIRECTORY (your next step)

Review of records & history. PAGE L 3
General physical. PAGE L 4
Proctosigmoidoscopy. PAGE L 6
Diagnostic studies. PAGE L 7
Your diagnosis and treatment. PAGE L 11

CODE

I = Indicated, required by presenting problem.
R = Routine, for screening or completeness of evaluation.
U = Probably useless but harmless in this case.
C = Contraindicated, not in patient's interest.
S = Spurious, bogus answer.

INCISIONAL OR PUNCH BIOPSY

Pathologist's report: Received in formalin is a small fragment of ulcerated tissue. The microscopic picture is typical of a granulomatous ulcer of the epithelium, with infiltration by lymphocytes and plasma cells and increased capillary proliferation and fibroblastic activity in the ulcerated area. Surrounding this, there is subepithelial infiltration with neutrophilic leukocytes and the epithelium shows elongation of the rete pegs.

Diagnosis: Granulomatous ulcer of the labium minus and clitoris.

List the diseases which might produce the above histologic picture.

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________

Write your answer, then turn to PAGE U 8.

PROCTOSIGMOIDOSCOPY

Findings: Sphincter: intact
Lumen: clear to a depth of about 10 cms. at which point it is partially obstructed by a mass of friable red granular tissue which bleeds on contact. Punch biopsies were taken from this area (See diagnostic studies PAGE L 7.)

NOTE: It was impossible to advance the sigmoidoscope pass this area of partial obstruction, therefore the examination was discontinued.

DIRECTORY
(Your Next Step)

Old records and history.	L 3
Physical examination.	L 4
Pelvic & rectal examination.	L 5
Diagnostic studies.	L 7
Your diagnosis and treatment.	L 11

RESULTS

1.	Positive (blood) negative (OCP)	(I)
2.	Negative film	(I)
3.	Not done	(C)
4.	No bony abnormalities	(U)
5.	Radiation changes only	(U)
6.	Apparently normal function and anatomy	(I)
7.	No abnormalities noted	(U)
8.	Not done	(U)
9.	Not done	(C)
10.	Within normal limits	(R)
11.	13 mgm%	(R)
12.	Hgb. 10, Hct. 31, WBC 8,000, differential normal, smear - iron def. anemia.	(R)
13.	No abnormalities noted	(U)
14.	See PAGE L 5 for findings.	(I)
15.	Partial obstruction from intrinsic mass 10 cm from anus; otherwise, normal	(I)
16.	See PAGE L 6 for findings also biopsy report this page	(I)
17.	O, positive	(U)
18.	Negative	(U)
19.	Squamous cell carcinoma	(I)
20.	115 mgm%	(R)
21.	Sp. G. 1.022, pH 5, S&A neg., micro, negative	(R)
22.	(mEq) Na 136, K 4.4, Cl 102	(U)
23.	Mild osteoarthritic changes, no osseous lesions	(U)
24.	Non reactive	(R)
25.	Class I, negative	(I)

CODE

I = Indicated, required by presenting problem.
R = Routine, for screening or completeness of evaluation
U = Probably useless but harmless in this case.
C = Contraindicated, not in patient's interest.
S = Spurious, bogus answer.

DIAGNOSTIC STUDIES

Please check the items below about which you would like information, then look up the results with the corresponding code numbers in the column on the left.

Chemistries (Blood, serum)
Bilirubin, direct, total ________ 8( )
Glucose, 2 hr. postprandial ________ 20( )
Electrolytes, Na, K, Cl ________ 22( )
Urea Nitrogen (BUN) ________ 11( )

Clinical & cyto-pathology, serology
Stool for blood, OCP ________ 1( )
Vaginal Pap smear ________ 25( )
VDRL ________ 24( )

Hematology
Blood Group & Rh ________ 17( )
CBC ________ 12( )

Urine tests
Urinalysis, complete ________ 21( )

X-rays
Abdomen, upper ________ 18( )
Barium enema ________ 15( )
Chest ________ 2( )
Cholecystogram ________ 8( )
GI series ________ 7( )
Pelvis, AP and lateral ________ 4( )
Pyelogram (IVP) ________ 6( )
Skull ________ 13( )
Spine, thoracic, lumbar ________ 23( )

Procedures and Surg. Pathology
Biopsy bladder ________ 9( )
Biopsy cervix ________ 5( )
Biopsy rectum ________ 19( )
Biopsy vagina, vulva ________ 3( )
Cystoscopy ________ 6( )
Glucose tolerance test ________ 8( )
Electrocardiogram ________ 10( )
Examination under anesthesia ________ 14( )
Proctosigmoidoscopy ________ 16( )

DIRECTORY (your next step)

Old records & history, PAGE L 3
Physical examination. PAGE L 4
Pelvic & rectal examination. PAGE L 5
Proctosigmoidoscopy. PAGE L 6
Your diagnosis and treatment. PAGE L 11

1. SYPHILIS
2. CHANCROID
3. GRANULOMA INGUINALE
4. LYMPHOPATHIA VENEREUM

There are other possible diseases which you may have mentioned, perhaps quite correctly, but the above four are the essential ones. If you missed any of these four, please turn directly to U 20 and complete its suggestion. After you have done so (or before, if you listed the four disease correctly) proceed directly to PAGE U 22.

DO NONE OF THE LISTED OPTIONS

What would you do instead?

____

____

____

Write your answer, then turn to L 9.

U 9

INCISIONAL OR PUNCH BIOPSY WITH OTHER TESTS

Very good. Other tests for what? List the diseases you would test for by means other than - or in addition to - biopsy.

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________

Write your answer, then go to U 10.

U 9

L 9

(Your answer)

Thank you for your response. It may be helpful in further revisions of this programmed text. For the present, however, please return to L 2, and select one of the options listed.

L 9

U 10

1. SYPHILIS
2. CHANCROID
3. GRANULOMA INGUINALE
4. LYMPHOPATHIA VENEREUM

There are other possible diseases which you might want to consider - Examples: Lipschutz' ulcer, vulvar impetigo, tuberculous vulvitis, mycotic ulcer, etc. - but the above four venereal diseases are essential ones you should have listed. If you omitted any of these four, please turn directly to U 20 and complete its assignment. After you have done so - or even before, if your list was correct-list the tests you would do in addition to biopsy:

1. ______________________________
2. ______________________________
3. ______________________________
4. ______________________________

Write your answer, then go to U 11.

U 10

L 10

Summary of radiation therapy:

Patient received two 70-hour radium applications two weeks apart. Each application consisted of a medium tandem loaded with a 15 and a 10 mg. radium source and two medium sized vaginal ovoids (Manchester type) each loaded with a 20 mg. radium source. Following the completion of the radium therapy, the patient was given external deep therapy to the pelvic walls (parametrial technique) and received a total of 3400 r tissue dose over a four-week period using a supervoltage (2mEv.) x-ray machine.

Total tumor dosages (x-ray and radium combined):

Point A: 8,000 r
Point B: 6,000 r

If you find that the above summary of the radiation treatment is unclear to you, please review:

FRAMES 321-361 in the programmed text Essentials of Gynecologic Oncology.

Afterwards you should continue with this case presentation.

DIRECTORY (your next step)	
General physical examination	L 4
Pelvic & rectal examination	L 5
Proctosigmoidoscopy	L 6
Diagnostic studies	L 7
Your diagnosis & treatment	L 11

L 10

Syphilis = DARKFIELD examination of lymph from ulcer

Chancroid = SMEARS from ulcer

Granuloma inguinale = SMEARS from ulcer or (from biopsy specimen)

Lymphopathia venereum = FREI test

If you made errors in this list, please turn to U 20 and complete the suggested assignments. After you have done so (or before, if you didn't need the review) turn to U 21 for your pathologist's report.

YOUR DIAGNOSIS AND TREATMENT

In your work-up of this patient you should have established whether or not this patient has recurrent carcinoma of the cervix and if so its location and extent. What is your diagnosis?

____

____

____

On the basis of the information you have, what is the Stage?__________

Write your answer, then turn to L 12.

EXCISIONAL BIOPSY

Pathologist's report: Received in formalin is a 2 X 2 X 5 cm. piece of tissue labelled "clitoris". There is a 1 cm. shallow, firm ulcer involving most of the right half of the specimen.

Microscopically, the picture is typical of a granulomatous ulcer of the epithelium, with infiltration by lymphocytes and plasma cells and increased capillary proliferation and fibroblastic activity in the ulcerated area. Surrounding this, there is an infiltration with neutrophilic leukocytes, and the epithelium shows elongation of the rete pegs.

Diagnosis: Granulomatous ulcer of epithelium (clitoris)

Your next step would be:

☐ Get a VDRL or Kahn test. U 13

☐ Request the pathologist to use special stains for spirochetes and Donovan bodies. U 18

☐ Wish you had studied the lesion more thoroughly before you removed it. U 2

☐ Do none of the things listed. U 16

Mark your choice, then turn to the UPPER PAGE indicated.

(Your Diagnosis)

Stage II, with recurrence - post- radiation

The original staging of a patient with cancer remains unchanged regardless of the later clinical course. (Obviously, most patients who are destined to die of cancer of the cervix eventually develop findings which if they were present at the time of the initial evaluation, would have put them in Stage IV, but they still retain their original staging).

What therapy would you offer this patient?

☐ Surgery. L 13

☐ Radiation. L 14

☐ Chemotherapy. L 15

☐ None of the above listed therapies. L 16

Mark your treatment of choice, then turn to the LOWER PAGE indicated.

VDRL OR KAHN TEST

Laboratory reports: Non-reactive

A negative serology is an expected finding in the presence of a primary chancre. Your study neither rules syphilis in or out.

Please turn to the PAGE U_____ from which you came. (U 3 or U 12)

SURGERY

Please select the surgical procedure which seems the most appropriate to you, then turn to the PAGE indicated.

☐ Exploratory laparotomy. L 18.

☐ Radical hysterectomy and pelvic lymph node dissection. L 19.

☐ Posterior pelvic exenteration. L 20

☐ Total pelvic exenteration. L 21

☐ Colostomy. L 22

☐ None of the operations listed. L 23.

U 14

OTHER STUDIES

Please list which studies.

____

____

____

____

Write your answer then go to U 15.

U 14

L 14

RADIATION

Your choice of radiation to treat this patient suggests that you perhaps failed to investigate her past treatment completely or that you need to know more about radiation therapy in the treatment of advanced cancer of the cervix. A brief review of this subject can be found in:

FRAMES 321-361 of Essentials of Gynecologic Oncology

FRAMES 317-320 in the same text cover the applicability of radiation therapy to this patient.

After you have reviewed the above sections, please return to L 12 and choose a more appropriate response.

L 14

U 15

(Your Answer)

The diagnosis of ulcerative lesions of the vulva almost always requires the use of some laboratory aids, including biopsy.

If you would like to review this subject, turn to PAGE U 20 and follow its directions.

If not, please choose another approach on PAGE U 3.

U 15

L 15

CHEMOTHERAPY

Chemotherapy for treatment of cancer of the cervix is still in an experimental stage for palliative purposes only. This patient has a lesion which may still be curable. Please return to L 12 and choose another reponse.

L 15

DO NONE OF THE THINGS LISTED

Please write what you would do.

NONE OF THE THERAPIES LISTED

Please suggest your plan of management.

Write your answer, then turn to L 17.

(Your answer)

____

Thank you for your response. It may be helpful to other students in later revisions of this program. Please turn to PAGE U 9 and choose another answer.

(Your answer)

____

Thank you for your answer. It may be helpful in subsequent revisions of this programmed text. For the present, however, please return to L 12 and choose one of the therapies listed.

U 18

SPECIAL (silver) STAINS for SPIROCHETES and DONOVAN BODIES

Report: Negative

What disease are Donovan bodies associated with?

______________ ______________

Can the pathologist diagnose chancroid by studying the histologic section he has?

____

What is the cause of chancroid? ______________ ______________

What other venereal disease might the patient have (excluding all those already mentioned - syphilis, chancroid and granuloma inguinale)? ______________
(name the disease)

What is the causative agent of this disease? ______________

Write your answers, then go to U 19.

U 18

L 18

EXPLORATORY LAPAROTOMY

Findings: The bowel in the pelvis is shrunken and partially devascularized as a result of the radiation therapy. There are no palpably enlarged aortic or pelvic lymph nodes. The adnexa are small and atrophic. The posterior surface of the uterus and cervix is fused to the anterior rectal wall in a solid tumor mass, which however is freely mobile. There is no palpable parametrial or bladder involvement.

Please return to L 13 and choose an additional surgical procedure.

L 18

U 19

GRANULOMA INGUINALE
  PROBABLY NOT
DUCREY BACILLUS (Hemophilus ducreyi)
LYMPHOPATHIA VENEREUM
A FILTERABLE VIRUS

If your answers to all of the above are correct you probably can name the remaining diagnostic test you should perform on your patient.

____
(Name the test and turn to U 24.)

If you missed any of these answers (or don't know the name of the test), please turn directly to U 20 and carry out its instructions.

U 19

L 19

RADICAL HYSTERECTOMY AND PELVIC LYMPH NODE DISSECTION

This is an appropriate operation for many cases of carcinoma of the cervix. It is not appropriate in this case for reasons which should have been determined preoperatively. Please return to L 2, and reevaluate your patient more thoroughly.

L 19

The subject of vulvar ulcers and venereal granulomas is covered in most gynecologic texts. It is also summarized in:

FRAMES 34-45 in Essentials of Gynecologic Oncology

Please complete this assignment. After you have done so, return to PAGE_____ which directed you here (better write the number in now).

POSTERIOR PELVIC EXENTERATION

This would be appropriate management in this case. The final decision to perform this operation, however, could only be made at the time the abdomen was opened for exploration. A report of the operative findings is available on L 18. You should refer to it if you have not already done so. You may then go on to PAGE 99.

U 21

Laboratory reports:

1. Darkfield examination for spirochetes: Negative
2. Smears for hemophilus ducreyi and for Donovan bodies: Negative
3. Biopsy of margin of ulcer:

Microscopic: There is granulomatous ulcer of the vulvar epithelium, with infiltration by lymphocytes and plasma cells, and increased capillary proliferation and fibroblastic activity in the ulcerated area. Surrounding this, there is infiltration with neutrophilic leukocytes, and the overlying epithelium shows elongation of the rete pegs.

Diagnosis: Granulomatous ulcer of the labium minus and clitoris, etiology to be determined.

The one remaining indicated test in your patient was positive. What was the test?____.

The test and its result are on U 25.

U 21

L 21

TOTAL PELVIC EXENTERATION

The decision to perform a total pelvic exenteration (that is, removal of all pelvic viscera including rectum, vulva, vagina, uterus, tubes, ovaries, bladder and urethra) can usually be made only at the time the abdomen is opened for exploration. Sometimes the findings will suggest that a less formidable and mutilating procedure may suffice. Total pelvic exenteration carries with it an operative mortality of about 25%. If a lesser procedure will serve the same purpose of curing the patient, it should be considered.

Please turn to L 18 and review the operative findings.

L 21

U 22

In your patient, who has a granulomatous ulcer of the vulva, presumably of venereal origin, what test would you use for:

Syphilis?______________________________

Chancroid?_____________________________

Granuloma inguinale?___________________

Lymphopathia venereum?_________________

Write your answers, then go to U 23.

U 22

L 22

COLOSTOMY

A colostomy is an appropriate procedure to divert the fecal stream if the patient's pelvic tumor is unresectable. What type of colostomy would you do?

☐ Sigmoid Colostomy. L 25

☐ Left transverse colostomy. L 26

Mark your answer, then turn to the LOWER PAGE indicated.

L 22

Syphilis: DARKFIELD examination for spirochetes

Chancroid: SMEARS and/or culture of the lesion for Hemophilus Ducreyi

Granuloma inguinale: SMEARS from the lesion for Donovan bodies

Lymphopathia venereum: ? ?

The best smear for the Donovan Bodies of granuloma inguinale is made from a fresh biopsy specimen, but in this case, your biopsy was submitted to the pathologist in formalin, and hence this opportunity was lost. The smears obtained from the lesion were negative for the Ducrey Bacillus and for Donovan bodies. The darkfield exam was negative.

What other test should have been done?

____

(If you don't know, see U 20 before proceeding to U 25.)

NONE OF THE OPTIONS LISTED

What surgery would you do?

____

____

____

Write your answer, then turn to L 24.

FREI TEST: POSITIVE

Your patient has lymphopathia venereum. After treatment with appropriate antibiotics, she will probably recover, minus her clitoris, which was removed unnecessarily.

Go on to the LOWER case.

(Your Answer)

Thank you for your answer. It may be helpful in further revisions of this programmed text. For the present, however, please return to L 13 and select another response.

FREI TEST: POSITIVE

Your patient's disease was lymphopathia venereum. After treatment with appropriate antibiotics (which are useful in this virus-caused disease) she recovered with no permanent ill-effects.

Go on to the LOWER case.

SIGMOID COLOSTOMY

This type of colostomy would probably require the use of a portion of the sigmoid colon which had been seriously damaged by the radiation therapy given several years ago. Any operation on this section of bowel would run a great risk of necrosis with very serious consequences for the patient. Furthermore, the choice of an unsatisfactory palliative operation at a time when the patient still has a chance to be cured by surgery is a very serious error. Please return to L 13 and choose another approach.

GO ON TO THE LOWER CASE ON THE BOTTOM OF PAGE L 1

LEFT TRANSVERSE COLOSTOMY

The above operation would permit a colostomy to be done well away from the area of radiation injury and devascularization. It would be the procedure of choice in a patient with an unresectable pelvic tumor involving the rectum and producing severe bleeding. It would be tragic, however, to condemn this patient to death with a palliative operation without being certain that she is indeed incurable. At the very least an exploratory operation should be done to establish this fact.

Please turn to L 18.

PROBLEMS IN WRITING CASE PRESENTATION PROGRAMS

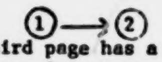
QUESTION: How do you keep track of the pages?

ANSWER: Make a flow chart as you write.

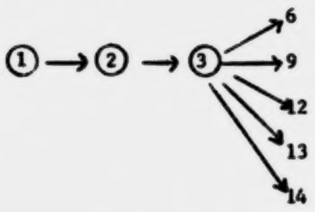
Example:

Suppose your first page presents the case, but calls for no written response, make a circle and number it.

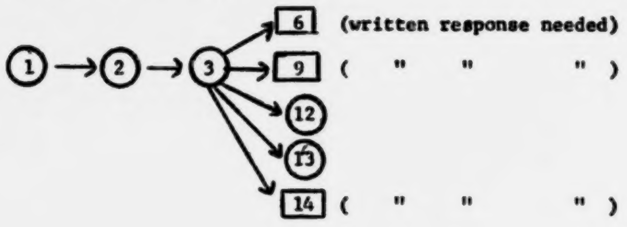
Suppose the second page also calls for no written response. Do the same thing, and add an arrow.



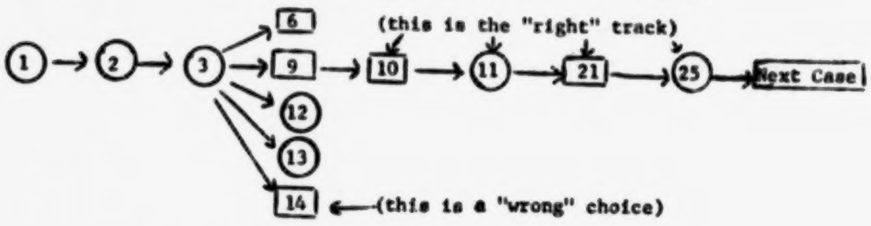
Suppose the third page has a multiple choice question which branches to several answers on different pages. Add the new page and make arrows to all the branches.



Suppose that some of the branches call for written responses. Use squares to identify them.

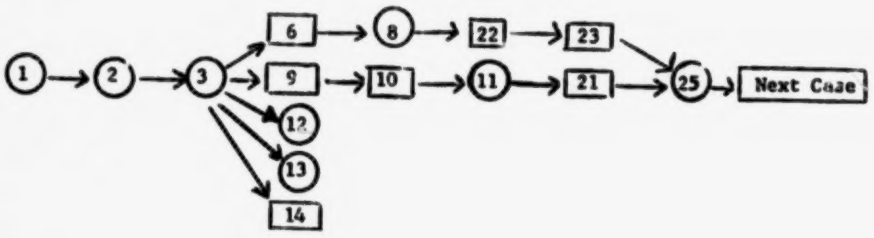


When branches occur, keep the "correct" or preferred responses all on the same horizontal line, with forward progress from left to right.


(this is the "right" track)

(this is a "wrong" choice)
1
2
3
6
9
10
11
21
25
Next Case
12
13
14

If there are two tracks leading to an acceptable solution to the problem, let them both proceed horizontally from left to right


1
2
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8
22
23
9
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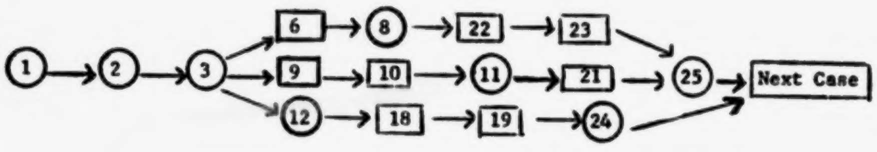
11
21
25
Next Case
12
13
14

In the UPPER case, there were three tracks which led to a solution of the problem


1
2
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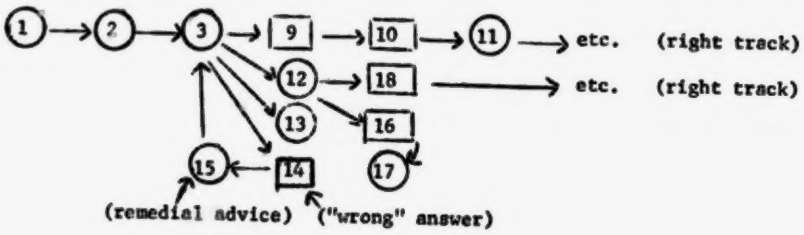
11
21
25
Next Case
12
18
19
24

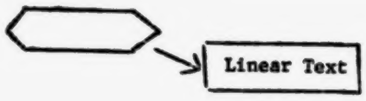
Diagram of "right answer" branches, Upper Case.

The middle track was the one we preferred. The other two were acceptable, but had disadvantages.

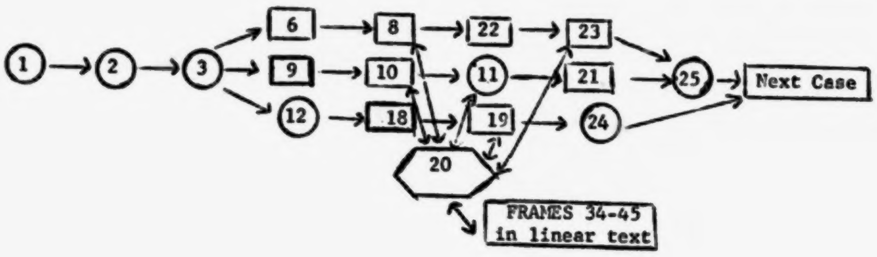
When there are branches representing erroneous responses, let them be represented by directions other than horizontal, left to right (up, down, backwards, etc.)


1
2
3
9
10
11
etc.
(right track)
12
18
etc.
(right track)
13
16
15
14
17
(remedial advice)
("wrong" answer)

We use a special symbol to indicate a "wrong answer" page which instructs the student to seek help elsewhere:


Linear Text

In the upper case, it is used only once, but there are many referrals to it:


1
2
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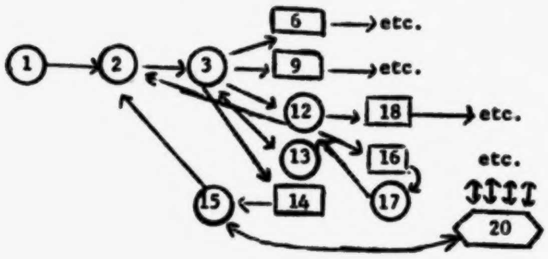
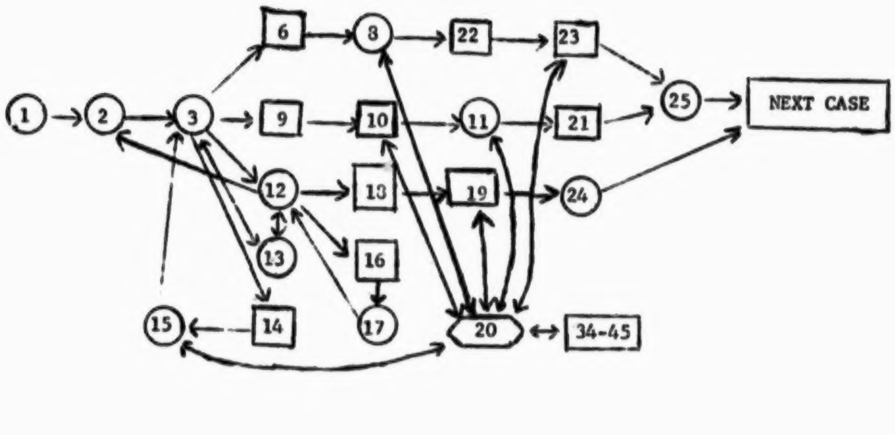
22
23
9
10
11
21
25
Next Case
12
18
19
24
20
FRAMES 34-45
in linear text

We use arrows to indicate each direction the student may take in working through the problem. Some arrows will be double-ended. Here is part of the Upper Case:


6
etc.
1
2
3
9
etc.
12
18
etc.
13
16
etc.
15
14
17
20

This looks complicated but becomes meaningful when you try to write a case, or try to trace a student's course through a problem. Please go on to PAGE 217.

DIAGRAM OF UPPER CASE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21
25
NEXT CASE
12
13
18
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16
15
14
17
20
34-45

LEGEND

○ = No written response

▭ = Written response

▤ = Data-gathering frame

⬡ = Referring frame

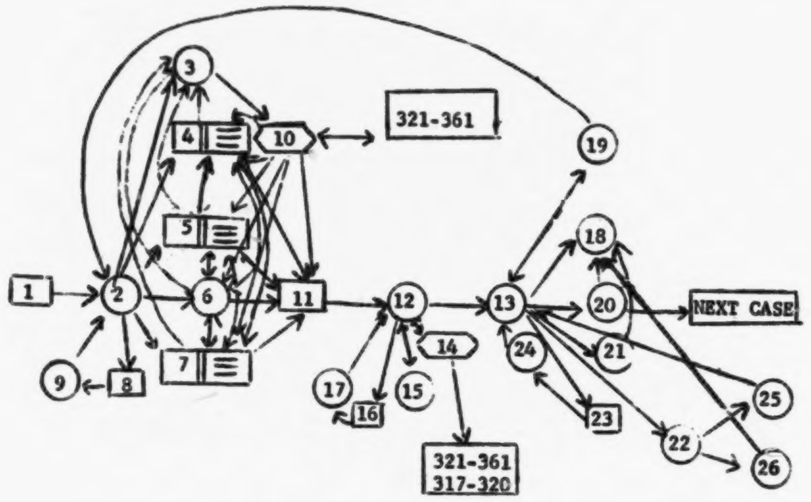
321-361 = Frames in other text

Discussion of Upper Case. On the opposite page, there is a diagram labelled "Upper Case." It illustrates the different paths which the student may take in working through this problem. In the diagram, the student's progress towards solving the problem is represented by horizontal movement from left to right beginning on Frame 1 and ending on Frame 24 or 25.

Frame 1 defines the problem. Frame 2 illustrates it. On Frame 2 the student is asked to choose his diagnostic studies. He may order them one at a time or he may order a whole battery of them at once. He is given five courses of action to choose from. Three of these lead to horizontal tracks which may lead to an eventual solution of the problem. If the student reaches this solution, he learns whether the course he chose was an efficient one or whether the same result might have been achieved by another course, with less wasted effort or perhaps with less mutilation of the patient. The student who does not follow one of these tracks but takes a different branch may be simply reprimanded or may be given remedial instruction. This remedial instruction may be contained in this text itself or it may consist of a referral to instruction elsewhere. In this case, the student who makes certain errors is referred to Frame 20, which in turn suggests that he read the eleven frames on diagnosis of vulvar lesions in our linear text. Afterwards, the student is requested to take up the problem at the point where he left the track.

We selected this problem for presentation because it seems to us to be a fairly clear example of how the practical consequences of selection and sequence in ordering certain diagnostic studies can be taught to the student. In our opinion, this type of presentation teaches the student something more than is taught in our linear text which, by the way, teaches the student to answer examination questions on this subject quite well. We anticipate that teaching by means of programmed case presentations is more apt to alter the student's performance in practice than it is to alter his performance on the usual type of examination.

DIAGRAM OF LOWER CASE



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16
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19
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21
22
23
24
25
26
321-361
321-361
317-320
NEXT CASE

LEGEND

○ = No written response

▭ = Written response

▭▤ = Data-gathering frame

⬭ = Referring frame

321-361 = Frames in other text

Discussion of Lower Case. The lower case also has a diagram (see opposite page). From the number of arrows and lines on it, it is obvious that the lower case is a complicated one. The problem as stated in Frame 1 is that of a patient with a complaint of rectal bleeding with onset several years after radiation therapy for cancer of the cervix. The case is designed to teach the student the consequences of his diagnostic workup (whether it is adequate or inadequate) on his choice of therapeutic procedures. Frame 1 presents the problem and asks the student how he would handle it.

Frame 2 gives the student a half dozen options for collecting additional information about the patient. The next eight frames give the student an opportunity to learn a great deal about the patient. The format forces him to collect the information piecemeal, item by item, but it gives him freedom to acquire this information in any order he chooses and to use his own judgement as to when he has enough information to manage the patient.

On Frame 11 he is asked to write down his diagnosis. He is not told immediately that his diagnosis is correct or incorrect. He proceeds on Frame 12 to consider various therapeutic possibilities. These include surgery, radiation, chemotherapy, and other forms of treatment. For inappropriate therapies, the student is given remedial instruction either in the text or by referral to other texts and then is asked to proceed further with his plans for therapy. If he chooses surgery, he is asked on Frame 13 to select from a half dozen possibilities the operation which seems to him most appropriate. His choices will reflect the adequacy of his diagnostic workup and his knowledge of the patient's disease and previous treatment.

You will note that this lower case is the same length as the upper case that we referred to previously. It makes much more extensive demands on the student's knowledge, however. In our opinion, to cover in a linear text all the information that this one case presentation demands of the student would require a text of several hundred frames. In our linear text, we made no attempt to cover the content of a programmed case such as this. In our opinion, linear programming is not an efficient way to teach clinical trouble shooting. For this purpose, the branching technique seems more appropriate, less time consuming and certainly much easier to write.

APPENDIX C

LETTER FROM DOCTOR SCHUMACHER WITH DESCRIPTION OF SPECIAL NATIONAL BOARD OF MEDICAL EXAMINERS, EXAMINATIONS A AND B.

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NATIONAL BOARD OF MEDICAL EXAMINERS
FOUNDED 1915 BY WILLIAM L. RODMAN, M.D.
133 SOUTH 36TH STREET
PHILADELPHIA 4

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TELEPHONE: AREA CODE 215
EVERGREEN 6-8600

CABLE ADDRESS NATBORD

August 7, 1963

P. L. Wilds, M.D.
Medical College of Georgia
Department of Obstetrics and Gynecology
Augusta, Georgia

Dear Dr. Wilds:

We have received your test material and are proceeding with the printing of test booklets and answer sheets. We plan to run two hundred copies of each examination and have these in your hands by September 1.

In constructing these tests the following procedures were followed to arrive at two equated examinations:

1. All items were drawn from the National Board pool on Ob-Gyn neoplasms. All had previously been used in National Board examinations and had been analyzed to determine their performance with National Board candidates.

2. Items were classified into nine sub-categories by yourself according to the specific subject-matter areas measured. Preliminary drafts of the two test forms were constructed to have approximately equal numbers of items from each sub-category. All duplicate items within a given test form were either shifted to the other test or eliminated.

3. The preliminary test drafts were analyzed to determine their average difficulty and discrimination indices according to previous performance with National Board candidates. Some items were shifted from one test form to another in order to make the two tests as equivalent as possible with respect to the two parameters. Whenever an item was taken from one test, it was replaced with an item in the same subject-matter sub-category from the other test.

4. The final forms of the examination each contain one hundred and eight items. The distributions of these items according to subject-matter

sub-categories are as follows:

Category	Number of Items Form A	Form B
1. Ovary and tube	30	25
2. Sarcomas	4	3
3. Fibroids	6	5
4. Endometriosis	17	13
5. Endometrium	12	10
6. Endometrium and Cervix	10	12
7. Cervix	13	27
8. Vagina-vulva	11	8
9. Choriocarcinoma	5	5
	108	108

The average difficulty levels of the final tests are: Form A .72, Form B .77. The average discrimination index (biserial correlation) of each form is: Form A .20, Form B .19.

From these data it appears that the two tests, as a whole, are reasonably equivalent. It should be noted, however, that no attempt was made to equate these tests within individual subject-matter sub-categories. Therefore, while it would be possible to obtain sub-scores for each category, such sub-scores might or might not be equivalent in terms of difficulty or discrimination.

I hope this provides the information you need regarding the method by which the tests were equated. Please let me know if you have further questions about this procedure.

Sincerely,

Charles F. Schumacher, Ph.D.
Director of Testing

CFS:aj

APPENDIX D

INSTRUCTIONS TO JUDGES (ORAL EXAMINERS)

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APPENDIX D

"Effectiveness of a Programmed Text in Teaching
Gynecologic Oncology to Junior Medical Students"

Instruction to Judges (Oral Examiners)

ORIENTATION

During each examining week (one in January, the other in May) you will be asked to test a group of about 45 junior medical students in gynecologic oncology. These students will have either completed or nearly completed a nine week clerkship in obstetrics and gynecology. In about equal numbers the students will have been taught the detection, diagnosis, and management of gynecologic tumors by one of two methods:

(a) a program of lectures by an outstanding lecturer

(b) an experimental programmed text

Students from both groups, in a scrambled order, will meet with the two examiners by appointment. During the oral examination, the student may volunteer information which will permit the examiners to determine whether he is from the control (lecture) group or from the experimental (programmed text) group. The examiners, however, are specifically requested not to try to determine from which group the student comes and to attempt, insofar as the student will permit them, to evaluate him without a knowledge of how he was taught. Insofar as possible, we would like to withhold this information from the examiners till after the last examination in the group. This is the only information about the project which the examiners should not know.

As a guide to the scope of the project you will be supplied in advance with a copy of "Objectives of the Course." This is an outline of the "content" of both the lecture course and the programmed text. The purpose of the oral examinations, however, is to evaluate the application of this content to problems of patient care, rather than simply to evaluate the student's knowledge of the content itself. The knowledge of content is being evaluated separately by written examinations specially prepared by the National Board of Medical Examiners. In the course of these examinations the student will answer almost all items from the National Board's pool of questions in gynecologic oncology. Copies of these examinations will be made available to you if you wish.

As a guide to the type of question we would like you to ask the student, we have prepared a dozen or so sample questions which you may use, not use, or vary as you please. Each of these questions is "open ended" and depending on what further information is supplied to the student, could lead to a variety of acceptable answers.

PROCEDURE

1. Students will be given appointments with the examining team at 45 minute intervals. For each student the examining team will be supplied with five IBM grade cards. These five cards will be marked as follows:

   (1) (student name), "application," examiner "A"

   (2) (student name), "content," examiner "A"

   (3) (student name), "application," examiner "B"

   (4) (student name), "content," examiner "B"

   (5) (student name), "application," final grade

These five cards are to be completed by the examining team at the conclusion of each examination.

2. We would like each oral examination to last 35 to 40 minutes. One examiner may ask questions and carry on a discussion with the student while the other listens. How frequently the examiners rotate the questioning and listening responsibility is left entirely to the discretion of the examiners.

3. At the conclusion of the examination the student is dismissed. The examiners should then immediately, without consulting each other, write down their individual grades for their estimates of the student's proficiency in "content" of gynecologic oncology and his proficiency in "application" of this content to problems of patient care. This uses up four of the five cards for that student.

4. After the two examiners have recorded their individual grades, they should then discuss the student's performance, if any discussion is necessary, and arrive by consensus or mutual agreement at a "final grade" which represents their joint opinion of the student's proficiency in "application". The final pooled grade will be the criterion score for assessing "application" in this study. The independent grades of judges A and B on application and content will be used for statistical studies of the reliability and validity of this type of examination as compared with other methods of student evaluation used in this project.

OTHER INFORMATION

Examiners will be kept as fully informed as possible by quarterly progress reports and results of examinations (including their own) as soon as they become available throughout the course of this project.

APPENDIX E

DESCRIPTIVE CATALOG OF NINE CLINICAL PROBLEM-SOLVING TESTS AND SAMPLE TEST A

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APPENDIX E

DESCRIPTIVE CATALOG OF PROBLEM-SOLVING TESTS

I. EIGHT TESTS EMPHASIZING DIAGNOSTIC SKILLS

1. Test A.

Presenting Problem: Post-menopausal vaginal bleeding

Diagnostic Process:

relevant information concealed by tab-item format in

23 History Items: diabetes, high blood pressure, past history of syphilis, previous breast surgery for cancer.

40 Physical Examination Items: Surgical absence of breast, ulcerative lesion of vagina

33 Diagnostic Tests and Procedures: biopsy of vaginal lesion, adenocarcinoma; x-ray, evidence of wide-spread metastatic disease.

Diagnosis: several appropriate choices in 50 options

Therapy: several appropriate choices in 44 options

2. Test A'

Presenting Problem: Same as A

Diagnostic Process:

relevant information concealed by tab-item format in:

23 History Items: diabetes, obesity

40 Physical Examination Items: obesity

33 Diagnostic Tests and Procedures: Vaginal cytology: suspicious
Fractional D&C, endocervix:
adenocarcinoma
endometrium:
estrogenic hyperplasia

Diagnosis: two options, including several appropriate choices

Therapy: 44 options, including several appropriate choices

3. Test A

Presenting Problem: Same as A

Diagnostic Process:

relevant information concealed by tab-item format in:

23 History Items: Same as A'

40 Physical Examination Items: Same as A'

33 Diagnostic Tests and Procedures: Vaginal cytology: negative
Fractional D&C, endocervix: endocervical tissue
endometrium: adeno-acanthoma

Diagnosis: several appropriate choices in 50 options

Therapy: several appropriate choices in 44 options

4. Test C

Presenting Problem: Abdominal pain and distention

Diagnostic Process:

relevant information concealed by tab-item format in:

23 History Items: non-contributory information in 23 categories

40 Physical Examination Items: findings suggestive of pelvic mass and ascites

37.Diagnostic Tests and Procedures: peritoneal fluid, cytologic changes suggestive of malignancy

Diagnosis: several appropriate choices in 38 options

Therapy: one appropriate sequenced treatment pattern included in 50 options.

5. Test D

Presenting Problem: Sudden onset of pain in right lower quadrant

Diagnostic Process:

relevant information concealed by tab-item format in

23 History Items: symptoms suggestive of acute appendicitis

40 Physical Examination Items: findings suggestive of acute surgical abdomen with right lower quadrant pelvic mass

36 Diagnostic Tests and Procedure Items: Sample of peritoneal fluid, evidence of intraperitoneal bleeding

Diagnosis: 8 options offered must be ranked in order of probability.

Therapy: One appropriate and several inappropriate options favored.

6. Test D'

Presenting Problem: Sudden onset of pain in right lower quadrant

Diagnostic Process:

relevant information concealed by tab-item format in

23 History Options: minor alterations from D not affecting diagnostic problem

40 Physical Examination Options: minor alterations from D not affecting diagnostic problem

36 Diagnostic Tests and Procedure Options: several alterations from D suggesting infectious process; sample of peritoneal fluid, pus

Diagnosis: 8 options offered must be ranked in order of probability

Therapy: One appropriate and several inappropriate options offered.

7. Test E

Presenting Problem: Routine pre-employment physical

Diagnostic Process:

relevant information concealed by tab-item format in

23 History Options: previous occupation, prostitute

40 Physical Examination Options: small ulcer on vulva

33 Diagnostic Tests and Procedure Items: VDRL, reactive, titer 1:64; Darkfield Examination of lymph from ulcer: negative for spirochetes Biopsy of ulcer: invasive squamous cell carcinoma

Diagnosis: 37 options offered, 3 correct ones must be chosen

Therapy: Any of several patterns in 33 options

8. Test E'

Presenting Problem: Same as E

Diagnostic Process:

relevant information concealed by tab-item format in

23 History Options: minor changes from E, not of diagnostic significance

40 Physical Examination Options: changes from E not of diagnostic significance

36 Diagnostic Tests and Procedure Options: VDRL, non-reactive Darkfield examination, negative; Smear of Lesion: positive for Donovan bodies Biopsy of ulcer: granulomatous lesion

Diagnosis: of 37 options, one is correct

Therapy: 33 options offered, several are acceptable.

II. TEST EMPHASIZING THERAPEUTIC SKILL

The following test was primarily designed to measure skill in management of a previously defined (diagnosed) clinical problem:

Test B, First Part of Test.

Presenting Problem: 30-year-old primigravida at 26 weeks gestation requiring prenatal care.

Diagnostic Process:

relevant information concealed by abbreviated (8 option) diagnostic workup; suspicious vaginal cytology.

Management Options Offered:

Wait till patient's next visit for routine antepartal care and inform her that the reports were satisfactory.
Call the patient back to your office, inform her of the results and repeat the Pap smear.
Call the patient back to your office, inform her of the results and perform a Schiller test and obtain cervical punch biopsies from any non-staining areas
Admit the patient to the hospital for cervical conization and endocervical curettage.
Empty the uterus by hysterotomy and refer patient to a radiologist for therapy.
Call in a cancer specialist to handle the problem.
None of the above options

The student is then given appropriate information leading him to further management options.

The student is then asked to consider in sequence each of the following diagnoses:

a. Cervix showing decidual reaction compatible with pregnancy.
Endocervical tissue showing squamous metaplasia with minimal atypia.

b. Atypical squamous cell metaplasia (dysplasia of cervix and endocervix)

c. Cervix with intraepithelial (pre-invasive) squamous cell carcinoma of the cervix with invasion of endocervical glands.

d. Invasive squamous cell carcinoma of the cervix extending to the margins of the specimen submitted, disease staged clinically as Ia

For these diagnoses, he is asked to consider his management if the diagnosis were made on the basis of a specimen obtained either by

1. cervical punch biopsy, or by
2. conization and endocervical curettage.

and for each, to make the best choice from the following options:

Perform a cone biopsy of the cervix and curet the endocervix in the third trimester of the pregnancy
Deliver vaginally at term, re-evaluate the cervix postpartum
Deliver by Caesarean section at term, then start definitive treatment of cervical lesion
Let pregnancy continue to term, then deliver by Caesarean hysterectomy
Interrupt pregnancy by hysterotomy, then treat the cervical lesion by appropriate surgery.
Interrupt pregnancy by hysterotomy, then treat the cervical lesion with a full course of x-ray therapy and intracavitary radium.
Ignore the pregnancy, perform a radical hysterectomy with pelvic lymphadenectomy as soon as possible.
Ignore the pregnancy, treat the patient with a full course of intracavitary radium and external x-ray therapy.
Let pregnancy continue to fetal viability, deliver the fetus by Caesarean section, then treat the cervical lesion by appropriate therapy
Let pregnancy continue to fetal viability, then induce labor, deliver infant vaginally and treat cervical lesion with radiation therapy.
Refer the patient to a specialist in oncology or radiology for further care.

Second Part of Test

Presenting Problem: Patient at 6 weeks postpartum requiring further management.

Student is required to consider each of the following diagnoses in sequence.

1. Pre-invasive squamous cell carcinoma of the cervix, established by cone biopsy in mid-pregnancy.

2. Pre-invasive squamous cell carcinoma of the cervix, established by conization and fractional D&C at six weeks postpartum.

3. Invasive squamous cell carcinoma of the cervix extending to the margins of biopsy specimen submitted (cone or punch); disease staged clinically as Stage Ia.

For each of these, the student is asked to select appropriate therapy from the following options:

Perform a fractional D&C and conization of the cervix
Perform a total hysterectomy
Perform a radical hysterectomy with pelvic lymph node dissection
Irradiate the patient using internal radium sources and external x-ray to give a total dosage of 16,000r at Point A and 8,000r at Point B in 6 weeks
Irradiate the patient using external x-ray and internal radium sources to give a total dosage of 8,000r at Point A and 6,000r at Point B in 6 weeks
Refer the patient to a specialist for further care.

9/28/65
12/6/65

CLINICAL PROBLEM SOLVING TEST

This "clinical problem solving test" consists of a case presentation in a format which is designed to test your ability and judgement in the diagnosis and treatment of the patient's disorder. You are provided with a test booklet and a special answer sheet. The two must be used together. The test is divided into three parts.

Part I. Collecting information about the patient.
Part II. Defining the patient's diagnosis.
Part III. Specifying your plan of treatment for the patient.

For each part of the test, you will use a different portion of the answer sheet in a different way. You may work through the test or inspect any part of it in any order you choose, but please be careful to follow the special instructions for each section.

The test begins on PAGE 2.

Prepared by: P. L. Wilds, M.D. and Virginia Zachert, Ph.D.
Department of Obstetrics and Gynecology
Medical College of Georgia
Augusta, Georgia

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CASE PRESENTATION

A fifty year old woman comes to your office with a complaint of intermittent vaginal bleeding of six weeks' duration. She adds that this is the first vaginal bleeding she has noted since her menopause two years ago at age 48.

In this test, the further management of this patient is your responsibility. You will be asked to specify all steps necessary for diagnosis and treatment.

DIRECTORY

Part I. Collecting Information, Instructions. PAGES 3-7
  A. History PAGE 9
  B. Physical Examination PAGE 11
  C. Diagnostic Studies and Procedures, Instructions. PAGES 12, 13
    Lists of Studies and Procedures PAGE 15
Part II. Defining Diagnosis, Instructions. PAGE 16
    Lists of Diagnoses PAGE 17
Part III. Specifying Treatment, Instructions. PAGES 20, 22
    Lists of Treatments PAGES 21, 23

Please go on to PAGE 3.

Instructions for Collecting Information

Purpose. Pages 9, 11, and 15 of this test, labelled MORE HISTORY, PHYSICAL EXAMINATION, and DIAGNOSTIC STUDIES AND PROCEDURES, are designed to provide you with information about the patient, but they give you only the information you ask for.

Format of the Booklet. The right-hand (odd-numbered) side of each of the three pages contains a list of categories of parts of the history, parts of the physical examination, and various tests and procedures. Each item is followed by a number in the right-hand margin (HISTORY items begin with 150, PHYSICAL EXAMINATION 250, TESTS AND PROCEDURES with 350, etc.)

Exercise 1. Open the test booklet to page 9, 11, or 15 and inspect the right-hand side of the page.

On the left-hand (even numbered) pages 8, 10, and 14, you will find that there is a column of numbers followed by a scrambled list of conflicting statements about the patient. Each statement is preceded by a number (beginning with 100 for history, 200 for physical examination, 300 for tests and procedures, etc.). Some statements in the list are directly applicable to your patient, others are irrelevant or bogus. The answer sheet is the key which tells you which information is applicable to the patient.

Exercise 2. Open the test booklet to "information" pages 8, 10, or 14 and inspect the left-hand side of the page, then return to PAGE 5.

After you have completed exercises 1 and 2, go on to PAGE 5.

000. Read instructions on PAGE 5 FIRST
001. Be sure you understand instructions on PAGE 5
002. Be sure you understand instructions on PAGE 5
003. Erase item 056 on answer sheet, and follow instructions on this page for the number you erase.
004. Be sure you understand instructions on PAGE 5.
005. Be sure you understand instructions on PAGE 5.
006. Be sure you understand instructions on PAGE 5.
007. Be sure you understand instructions on PAGE 5.
008. Be sure you understand instructions on PAGE 5.
009. Be sure you understand instructions on PAGE 5.
010. Proceed to Instruction #2.
011. Be sure you understand instructions on PAGE 5.
012. Be sure you understand instructions on PAGE 5.
013. Be sure you understand instructions on PAGE 5.
014. Be sure you understand instructions on PAGE 5.
015. Be sure you understand instructions on PAGE 5.
016. Be sure you understand instructions on PAGE 5.
017. Be sure you understand instructions on PAGE 5.
018. This is just to practice erasing numbers.
019. Be sure you understand instructions on PAGE 5.
020. Be sure you understand instructions on PAGE 5.
021. Be sure you understand instructions on PAGE 5.
022. Proceed to PAGE 6.
023. Be sure you understand instructions on PAGE 5.
024. Be sure you understand instructions on PAGE 5.
025. Be sure you understand instructions on PAGE 5.
026. Be sure you understand instructions on PAGE 5.
027. Proceed to Instruction #3 on PAGE 5.
028. Be sure you understand instructions on PAGE 5.
029. This is just to practice erasing numbers.
030. Be sure you understand instructions on PAGE 5.
031. This is just to practice erasing numbers.
032. Be sure you understand instructions on PAGE 5.
033. Be sure you understand instructions on PAGE 5.
034. Be sure you understand instructions on PAGE 5.
035. Be sure you understand instructions on PAGE 5.
036. Be sure you understand instructions on PAGE 5.
037. Be sure you understand instructions on PAGE 5.
038. Be sure you understand instructions on PAGE 5.
039. Be sure you understand instructions on PAGE 5.
040. Be sure you understand instructions on PAGE 5.
041. Be sure you understand instructions on PAGE 5.
042. Be sure you understand instructions on PAGE 5.
043. Be sure you understand instructions on PAGE 5.
044. Be sure you understand instructions on PAGE 5.
045. Be sure you understand instructions on PAGE 5.
046. Be sure you understand instructions on PAGE 5.
047. Be sure you understand instructions on PAGE 5.
048. Be sure you understand instructions on PAGE 5.
049. Be sure you understand instructions on PAGE 5.

Answer Sheet. The answer sheet consists of ten columns numbered from 0 to 9. The columns are made up of numbers in numerical order, ranging from 050 to 099 in column 0 to 950 to 999 in Column 9. Each of these numbers corresponds to the item with the same number on the right-hand page of the test booklet. To the right of each of the first four columns on the answer sheet, there is a stripe of erasable ink. Beneath this stripe there is a column of numbers in scrambled order. These concealed numbers correspond to numbered items on the left-hand (even numbered pages) of the test booklet. To obtain information about your patient, you must erase the proper areas in each stripe of the answer page, read the concealed numbers, then read the items with the corresponding numbers on the left-hand pages of the test booklet and be guided by the information you are given.

Exercise 3. The first column, Column 0, is for practice.

Instruction #1. On the answer sheet, in Column 0 please erase item 050. When you have done so, Item 050 on the answer sheet should look like this:

050 003

Now look at Page 4 (opposite) and follow the instructions given for Item 003.

Instruction #2. If you followed the instructions for Item 003 on page 4, the top of Column 0 of the answer sheet should now look like this:

050 003
051 ■
052 ■
053 ■
054 ■
055 ■
056 010
057 ■
058 ■

Now please practice erasing items 051, 052, 053, and 054.

Instruction #3. If you have completed Instruction #2, the top of Column 0 should now look like this:

050 003
051 029
052 018
053 031
054 027
055 ■
056 010
057 ■
058 ■

Now please erase Item #055, and follow instructions.

Scoring. The parts of this test dealing with history and physical examination have two requirements which must be completed in this order:

FIRST: You must erase the proper items to get the information you need.

SECOND: You must assign to proper categories all the erased items in these parts of the test.

You will receive a score (positive or negative) for each numbered item in the test booklet whether you mark it or not. Please do not skip any items but consider each one carefully.

FIRST: A. Erase all items which fall into these two categories:

1. Indicated items. These are ones where the collection of information is directly related to the patient's problem as it has presented itself to you. For example, in a patient with a history of hypertensive disease, determining the patient's blood pressure would be clearly an "indicated" item.
2. Routine items used for screening, ruling out complications, or adding to useful general information about the patient.

B. Do not erase any of the following items:

1. Useless items. These are items which have no bearing, direct or indirect, on the patient's problem and are considered valueless even for screening or survey purposes.

Go on to PAGE 7.

SECOND: Assigning Items to Categories:

A. Erased Items.

1. If you consider that the item was clearly "indicated" by the nature of the patient's problem, make a mark to the right of the erased number in the column indicated, like this:

199 143▬

2. If you considered that the item you erased was "routine" and was useful only for screening or for general information or perhaps just to satisfy your curiosity, make no mark, just leave the number as it stands, like this:

199 143===

B. Unerased Items.

1. If the item you didn't erase was considered useless but harmless, make no mark, leave the item as it stands, like this:

199 ■===

C. Changing Your Mind.

Once the number on the answer sheet has been erased, it can't be "re-covered", so don't try to. You may erase or add pencil marks as you see fit.

Instruction: Proceed to consider all items on PAGES 9 and 11.

Reminder: Be sure to consider each item. Remember that all items are scored, even the ones you leave unerased (the score may be positive or negative, depending on the item.)

INFORMATION

100. Sometimes incontinent
101. Chronic alcoholic
102. Living and well
103. None
104. Has apartment in own house
105. Uses Ex-lax occasionally
106. Always "nervous."
107. College graduate
108. Frequent backache
109. Periods 12x30x5, were prolonged and irregular for 3 years before menopause at 48.
110. None
111. No operations
112. Teetotaler, on 1800 cal. diet
113. Wears glasses for reading
114. Asymptomatic
115. Diabetes 10 years duration; syphilis 15 years ago, adequately treated. Breast cancer 8 years ago, treated by surgery.
116. Takes 1 gm. Tolbutamide daily
117. Appendectomy at 23, left mastectomy at age 40.
118. High school
119. Usual childhood diseases only.
120. None
121. Hasn't felt well for years.
122. None
123. Has been taking "female hormone" pills for years for "the change."
124. Occasional frequency, no dysuria.
125. None
126. Lives with husband 57.
127. Has diabetes & high blood pressure.
128. No information available
129. All in Europe
130. Had cancer of (?) at age 46, and is separated from spouse.
131. Runs boarding house
132. No recent change
133. Spouse died 4 years ago of Tbc.
134. None
135. Gross hematuria (one day episode) 2 months ago.
136. Regular and satisfactory (friend rents room from her) but has had postcoital bleeding for 6 weeks.
137. Severe
138. Severe shortness of breath and minimal excretion
139. None
140. Sometimes has palpitations.
141. Frequent occipital headaches.
142. Died of cancer of the womb
143. Eats "what she pleases," mostly carbohydrates.
144. Still bleeding
145. Suffers from hemorrhoids
146. None noted
147. Patient refuses to answer
148. You can't get here from there.
149. Living and well.

MORE HISTORY

You may assume that the Chief Complaint and Present Illness as given are complete and correct. For additional information please select AS MANY of the items below as interest you, erase the code numbers of these items in the proper column of the answer sheet, then find the information with the corresponding code numbers on the opposite page. On the answer sheet, make your erasures in COLUMN 1.

Past Medical History	Illnesses	150
	Injuries	151
	Operations	152
	Pregnancies	153
Family History	Father	154
	Mother	155
	Siblings	156
	Others	157
Social History	Schooling	158
	Occupation	159
	Home Environment	160
	Marital situation	161
	Sex life	162
	Habits	163
	Drugs and Medicines	164
System Review	General (wgt., fever, weakness, etc.)	165
	HEENT	166
	CVR	167
	GI	168
	GU	169
	GYN	170
	NP	171
	Musculoskeletal	172

After you have completed your erasures, mark Items 150 to 172 on the answer sheet according to the following code:

Routine or screening item	199 143=== (no mark)
Indicated, essential item	199 143▬ (mark to right)
Useless but harmless item	199 ■=== (no mark)

When you have completed your marking, proceed to PAGE 11.

INFORMATION

200. Not noted
201. All present and equal
202. None palpable.
203. 5'0", 190 lbs.
204. Well-formed
205. Not enlarged
206. Not enlarged
207. Fungating exophytic lesion
208. Intact
209. Atrophic
210. Grade II changes, capillary microaneurisms.
211. Enlarged to level of umbilicus.
212. No abnormalities noted
213. Supple
214. 2 cm. ulcer on posterior wall at hymenal ring.
215. 37°, 80, 18, 180/112
216. Obese
217. Not felt
218. Moist
219. Old third degree laceration
220. Normal
221. Not palpable
222. Unremarkable
223. Right normal, papilledema of left disc.
224. Undistended
225. Physiologic
226. Old mastectomy scar on left; right negative. No nodes.
227. Well-formed
228. Well-formed
229. Well-developed, obese W.F.
230. Unobstructed
231. Not enlarged
232. Nothing abnormal
233. No abnormalities
234. Atrophic
235. Distended, typanitic with hyperactive bowel sounds
236. Normal size, no murmurs
237. Within normal limits
238. Tremendously obese with old laparotomy scar
239. Left drum perforated
240. Midline
241. Not noted
242. Intact
243. Moderate enlargement, totally irregular rhythm, no murmurs
244. No abnormalities noted.
245. Confirms pelvic findings.
246. Atrophic
247. Examination unsatisfactory
248. Pap smear taken, see report
249. Not enlarged, mid-position.

GENERAL PHYSICAL EXAMINATION

Please select AS MANY of the items below as you wish to examine. In the proper column of the answer sheet, erase the code numbers of these items, and look up the findings with the corresponding code numbers on the opposite page.

On the answer sheet, make your erasures in COLUMN 2.

TPR, BP	250
Hgt., wgt.	251
General description	252
Skin	253
Lymphatics	254
Head and face	255
Hair	256
Eyes	257
Ears	258
Nose	259
Mouth, teeth, throat	260
Neck	261
Trachea	262
Thyroid	263
Vessels	264
Chest	265
Breasts and axillae	266
Heart	267
Lungs	268
Abdomen	269
Liver, spleen, kidneys	270
Masses	271
Tenderness	272
Pelvic examination	273
Hair distribution	274
Ext. genitalia	275
SUB glands	276
Introitus and perineum	277
Vagina	278
Cervix	279
Uterus	280
Adnexa	281
Rectal	282
Sphincter	283
Masses	284
Back	285
Extremities	286
Pulses	287
Deep tendon reflexes	288
Neurological	289

When you have completed your erasures, **mark items 250-289** on the answer sheet according to the following code:

Routine or screening item	199 143===	(no mark)
Indicated, essential item	199 143▬	(mark to right)
Useless, but harmless item	199 ■===	(no mark)

After you have completed your marking, proceed to PAGE 12.

INSTRUCTIONS FOR DIAGNOSTIC TESTS AND PROCEDURES

Scoring. The part of this test dealing with diagnostic tests and procedures is similar to the part dealing with history and physical examination, but has an additional requirement.

FIRST. You must erase the proper items to get the information you need

SECOND. You must assign to proper categories all items in this part of the test, both erased and unerased (This is the new requirement).

You will receive a score (positive or negative) for each numbered item in this part of the test whether you mark it or not. Please do not skip any items but consider each one carefully.

FIRST. A. Erase all items which fall into these two categories:

1. Indicated Items. These are ones where the collection of information from diagnostic tests or procedures is directly related to the patient's problem as it has presented itself to you.

2. Routine Items. These are items used for screening or survey or for ruling out complications, not directly related to the patient's primary illness.

B. Do not erase any of the following items.

1. Useless items. These are diagnostic tests and procedures which have no bearing, direct or indirect, on the patient's problem but are essentially harmless. They may, however, cost the patient time, money, and minor discomfort or anxiety.

2. Contraindicated items. These are tests or procedures which subject the patient to unnecessary and unjustifiable risks, anxiety, pain, or discomfort.

Go on to PAGE 13.

SECOND. Assigning Items to Categories.

A. Erased Items.

1. If you consider that the item was clearly indicated by the nature of the patient's problem, make a mark to the right of the erased number in the column indicated, like this:

399===319▬▬▬

2. If you considered that the item you erased was "routine" and was useful for only screening or for general information, or perhaps just to satisfy your curiosity, make no mark, just leave the number as it stands like this:

399===319===

B. Unerased Items.

1. If the item you did not erase was considered useless but harmless make no mark, simply leave the item as it stands like this:

399===■===

2. If you decide not to erase a number because it seems contra-indicated, harmful and not in the patient's interest, make a mark in the space provided to the left of the unerased number like this:

399▬▬▬■===

C. Changing Categories. Occasionally, there will be a diagnostic test or procedures which at first appear to be "contra-indicated" and should be marked as such. Later, when you gain additional information about the patient, this previously "contra-indicated" item now becomes "indicated." This can be shown by erasing the number and making marks on both sides of it like this:

399▬▬▬319▬▬▬

Instructions: Proceed to consider all items on PAGE 15.

Reminder: Be sure to consider each item. Remember that all items are scored, even the ones you leave both unerased and unmarked.

INFORMATION

300. Negative
301. Not indicated
302. Negative
303. Non-reactive
304. Negative
305. Negative
306. Negative
307. Squamous cell carcinoma, invasive
308. Left ventricular hypertrophy
309. No abnormalities
310. Na 140, K 3.8, CL 98, CO_2 25
311. Class I, atrophic smear
312. Report not available
313. Negative
314. Class II, estrogen effect
315. Class IV (positive) malignant cells present
316. No abnormalities
317. F 100, 1 hr. 220, 2 hr. 190, 3 hr. 140
318. Hct. 36, WBC 8,000, differential normal
319. Marked cardiac enlargement with hypertensive contour. Left brease shadow absent.
320. Less than 6 % retention at 45 minutes.
321. No evidence of extension beyond the uterus, no enlarged lymph nodes or signs of peritoneal spread.
322. 180 mg%
323. Aortic lymph nodes are enlarged, and on biopsy and frozen section they show adenocarcinoma. Metastases to liver are also palpable. No evidence of peritoneal spread.
324. Specific gravity 1.010, pH 5.8 glucose 2+, acetone negative, albumin positive, microscopic: occasional WBC.
325. Chronic cervicitis with squamous metaplasia
326. Reactive, titer 1:64
327. Report not available
328. Chronic cervicitis with squamous metaplasia
329. O, Rh positive
330. Negative
331. 4 K-A units/100 ml.
332. Negative
333. Negative
334. Findings: same as noted elsewhere.
335. Patient dies on operating table of pulmonary edema.
336. Negative film. Heart normal size.
337. Endocervical tissue
338. F [illegible] 1 hr. 110, 2 hr. 68, 3 hr. 80
339. 10 mgm%
340. Negative
341. Positive
342. Chronic cervicitis
343. Na 120, K 5.1, Cl 86, CO_2 11 (mEq/1)
344. Negative
345. Scattered spherical ("snowball") densities in both lung fields, minimal cardiac enlargement
346. Negative
347. Hematocrit 23, WBC 6,000, hypochromic, microcytic anemia.
348. 40% excretion in 15 minutes
349. Adenoacanthoma.

DIAGNOSTIC STUDIES AND PROCEDURES

Please select AS MANY of the items below as you wish to examine. In the proper column of the answer sheet, erase the code numbers of these items, and look up the findings with the corresponding code numbers on the opposite page.

On the answer sheet, make your erasures in COLUMN 3.

Chemistries (blood, serum)	Alk. phosphatase	350
	Bilirubin, direct, indirect	351
	Glucose, 2 hr., postprandial	352
	Electrolytes, Na, K, Cl, CO_2	353
	Urea Nitrogen (BUN)	354
Clinical & cyto-pathology	Stool for blood, OCP	355
	Vaginal pap smear	356
serology	VDRL	357
Hematology	Blood group, and Rh	358
	CBC	359
Urine tests	Urinalysis, complete	360
X-rays	Abdomen	361
	Barium enema	362
	Chest	363
	Cholecystogram	364
	GI series	365
	Pelvis	366
	Pyelogram (IVP)	367
	Skull	368
	Spine	369
Procedures	BSP	370
	Cystoscopy	371
	Darkfield exam for T. Pallidum	372
	Electrocardiogram	373
	Examination under anesthesia	374
	Frei test	375
	Glucose tolerance test	376
	PPD or Tuberculin Test	377
	Proctosigmoidoscopy	378
	PSP	379
	Smears for Donovan bodies	380
	Smears for H. Ducreyi	381
Diagnostic Surgery	Biopsy cervix (punch)	382
	Biopsy vagina	383
	Conization of cervix	384
	D&C, endocervix	385
	D&C, endometrium	386
	Exploratory laparotomy	387

After you have completed your erasures, mark items 350 to 387 on the asnwer sheet according to the following code:

Routine or screening item	199===143=== (no mark)
Indicated, essential item	199===143—— (mark to right)
Useless but harmless item	199===■=== (no mark)
Contraindicated, harmful item	199——■=== (mark to left)

After you have completed your marking, proceed to PAGE 16.

PART II

YOUR DIAGNOSIS

DESCRIPTION OF PART II

The test booklet. This section of the test consists of lists of primary and secondary diagnoses which you are asked to divide into three categories:

1. Diagnoses which have been excluded by your history, physical exam, or diagnostic tests and procedures.
2. Diagnoses which were not excluded by your history, physical exam, or diagnostic tests and procedures.
3. Diagnoses which were established or rated **most** likely by your history, physical examination and/or diagnostic tests and procedures.

The answer sheet. Column 4 of the answer sheet consists of a column of numbers corresponding to the code numbers of the listed diagnoses. The column of numbers is followed by three columns of spaces in which you are to mark your answers with pencil as follows:

1. Column 4 EXCLUDED is for diagnoses you have excluded.
2. Column 4 NOT EXCLUDED is for diagnoses you have not excluded.
3. Column 5 ESTABLISHED is for established or most likely diagnoses

Instructions for PAGE **17**.

FIRST: From the list on the opposite page, select all the diagnoses which your workup of history and/or physical examination and/or diagnostic studies and procedures has permitted you to exclude from further consideration. Mark each of these in the Column 4 EXCLUDED of the answer sheet, at its proper number.

SECOND: From the list on the opposite page, select all the diagnoses which you were unable to exclude by the choices of items of history, physical examination, and diagnostic tests and procedures which were available to you. Mark each of these in Column 4 NOT EXCLUDED of the answer sheet, at its corresponding number.

LIST OF DIAGNOSES
COLUMN 4

Adenoacanthoma, primary, of the endometrium	450
Adenocarcinoma, primary, of cervix	455
Adenocarcinoma, primary of endometrium	461
Adenocarcinoma, primary of vagina	466
Adenocarcinoma, metastatic from primary in breast	471
Adenocarcinoma, metastatic from primary in colon	476
Adenocarcinoma, metastatic from primary in ovary	481
Carcinoma, squamous cell, of cervix	485
Chancroid	491
Diabetes mellitus	492
Exogenous obesity	493
Granuloma inguinale	494
Hypertensive vascular disease	495
Lymphopathia venereum	496
Pulmonary tuberculosis, active	497
Pulmonary tuberculosis, inactive	498
Positive serology	499

Instructions: When you have completed this page, proceed to PAGE 18.

INSTRUCTIONS FOR PAGE 19

From your choice of the diagnoses which were not excluded by your workup, please indicate in the list on PAGE 19 the diagnoses which are definitely established or, of the choices given, most likely. Of competing or conflicting diagnoses, there can be only ONE which is most likely. The patient may, however, have a number of unrelated conditions in addition. Mark each of your selections in COLUMN 5 ESTABLISHED of the answer sheet, at its proper number.

ESTABLISHED OR MOST LIKELY DIAGNOSES
COLUMN 5

Adenoacanthoma, primary, of endometrium (stage unspecified)		550
	Stage I	551
(specify stage if you can)	Stage II	552
	Stage III	553
	Stage IV	554
Adenocarcinoma, primary of cervix (stage unspecified)		555
	Stage 0	556
	Stage I	557
(specify stage if you can)	Stage II	558
	Stage III	559
	Stage IV	560
Adenocarcinoma, primary, of endometrium (stage unspecified)		561
	Stage I	562
(specify stage if you can)	Stage II	563
	Stage III	564
	Stage IV	565
Adenocarcinoma, primary of vagina (stage unspecified)		566
	Stage I	567
(specify stage if you can)	Stage II	568
	Stage III	569
	Stage IV	570
Adenocarcinoma, metastatic from primary in breast		571
	With spread to cervix	572
(specify spread if appropriate)	With spread to lungs	573
	With spread to ovaries	574
	With spread to vagina	575
Adenocarcinoma, metastatic from primary in colon		576
	With spread to cervix	577
(specify spread if appropriate)	With spread to lungs	578
	With spread to ovaries	579
	With spread to vagina	580
Adenocarcinoma, metastatic from primary in ovary		581
	With spread to cervix	582
(specify spread if appropriate)	With spread to lungs	583
	With spread to vagina	584
Carcinoma, squamous cell of cervix (stage unspecified)		585
	Stage 0	586
	Stage I	587
(specify stage if you can)	Stage II	588
	Stage III	589
	Stage IV	590
Chancroid		591
Diabetes mellitus		592
Exogenous obesity		593
Granuloma inguinale		594
Hypertensive vascular disease		595
Lymphopathia venereum		596
Pulmonary tuberculosis, active		597
Pulmonary tuberculosis, inactive		598
Positive serology		599

Instructions: When you have completed this and all preceding pages in Part II, proceed to PART III on PAGE 20.

PART III

YOUR PLAN OF TREATMENT

DESCRIPTION OF PART III

On the basis of the information which has been made available to you, you should not only be able to define your patient's problems, you should also be able to outline a plan of managing this patient's major illness. This part of the test is divided into two sections.

1. Selection and sequencing of methods of therapy. PAGE 21
2. Detailed treatments within each method of therapy. PAGE 23

The booklet and answer sheet for this section are self-explanatory.

Instructions for PAGE 21.

The opposite page offers a list of three methods of therapy in every possible combination and sequence. Please make ONE selection and record it in Column 6 of the answer sheet by filling in the blank next to the appropriate code number.

SELECTION AND SEQUENCING OF METHODS OF THERAPY
COLUMN 6

Make one choice in COLUMN 6.

TREATMENT	
Hormonal therapy only	650
Radiation therapy only	651
Surgical therapy only	652
Hormonal therapy followed by radiation therapy	653
Hormonal therapy followed by surgical therapy	654
Radiation therapy followed by hormonal therapy	655
Radiation therapy followed by surgical therapy	656
Surgical therapy followed by hormonal therapy	657
Surgical therapy followed by radiation therapy	658
Hormonal, then radiation, then surgical therapy	659
Hormonal, then surgical, then radiation therapy	660
Radiation, then hormonal, then surgical therapy	661
Radiation, then surgical, then hormonal therapy	662
Surgical, then hormonal, then radiation therapy	663
Surgical, then radiation, then hormonal therapy	664
None of those listed	665

Mark your ONE choice, then proceed to PAGE 22.

INSTRUCTIONS FOR PAGE 23

Prerequisite.

Use the opposite page only after you have selected your sequence of treatment on PAGE 21 and recorded your choice in Column 6 of the answer sheet.

On the opposite page, select AS MANY items as you wish, but keep in mind that your choice must be related to the sequence of treatment you have previously chosen. Mark all of your choices on the answer sheet in Column 7.

Note: Columns 8 and 9 on the answer sheet are not used in this test.

DETAILED TREATMENTS
COLUMN 7

HORMONAL TREATMENT

	Androgen therapy	750
	Estrogen therapy	751
	Progestational therapy	752
(specify therapy)	Continuous estrogen-progestin therapy	753
	Cyclic estrogen-progestin therapy	754

RADIATION TREATMENT

A. External (specify source)	Conventional x-ray		760
	Supervoltage or telecobalt		761
(specify targets)	Cancericidal dosage (>5,000r):	lung fields	762
		upper abdomen	763
		entire abdomen	764
		pelvic cavity	765
	Castrating dosage (<2,500r):	ovaries	766
B. Internal (specify source	Vaginal ovoids		770
(radium)	Uterine tandem		771
	Heyman's capsules		772
(specify dosages)	Dose at vaginal mucosa	2,000-3000 r	773
	(from vaginal ovoids)	5,000-6000 r	774
		10,000-12,000 r	775
	Dose at uterine surface	2,000-3,000 r	776
	(from Heyman's capsules	5,000-6000 r	777
	or tandem)	10,000-12,000 r	778
	Dose at Point A	2,000-5,000 r	779
	(from tandem, ovoids, and	7,500 r	780
	external sources)	15,000 r	781
	Dose at Point B	5,000 r	782
	(from all sources)	10,000 r	783

SURGICAL TREATMENT

	Exenteration of pelvis, anterior	785
	Exenteration of pelvis, posterior	786
	Exenteration of pelvis, total	787
(specify procedures)	Radical hysterectomy	788
	Subtotal hysterectomy	789
	Total hysterectomy	790
	Omentectomy	791
	Pelvic lymph node dissection	792
	Salpingo-oophorectomy, bilateral	793
	Salpingo-oophorectomy, unilateral	794

When you have finished this and all preceding pages, you have completed this test.

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APPENDIX F

MEMORANDA ON COURSE CONTENT COMPARABILITY, USE OF VISUAL AIDS, AND TIME TO CRITERION RECORDS; SAMPLE TIME SHEET

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MEDICAL COLLEGE OF GEORGIA

EUGENE TALMADGE MEMORIAL HOSPITAL
AUGUSTA GEORGIA 30902

DEPARTMENT OF OBSTETRICS
AND
GYNECOLOGY

15 May 1963

MEMORANDUM

TO: Mr. Thomas Clemmens

FROM: Doctor P. L. Wilds

SUBJECT: Content Comparability of Programmed Text and Lectures.

The following steps have been taken to insure that the content of the two methods of instruction will be as nearly alike as possible.

1. Both programmed text and lectures will be based on material taken from the same student text (i.e. Behrman and Gosling's Fundamentals of Gynecology). This text is an elementary one (not a reference work for physicians) and contains very little extraneous material which either programmer or lecturer would be willing to omit from his course.

2. Both lecturer and programmer have agreed to follow a detailed outline of the course, based on material in the above textbook, but expressing specific objectives in behavioral terms. This outline specifies the skills we expect a student to be able to demonstrate after successful completion of the course.

3. In certain content areas where the textbook needs amplification or updating (such as cancer therapy and staging of certain pelvic tumors) lecturer and programmer have agreed to adhere to the established gynecologic cancer policy of the Medical College of Georgia. This is a detailed printed guide.

4. The programmer will present his coverage of the content in no greater detail than the lecturer does. This comparability of detail will be achieved partly by restricting the length of the program so that the average student's investment of time in working through it would be the same or less than that he would spend in a comparable lecture series, and partly by joint conferences between programmer and lecturer, should this need arise.

(Memorandum to Mr. Thomas Clemmens continued) Page #2

I anticipate that the comparability of content between the lecture series and the programmed text will be much closer than our testing methods can detect. The examinations of the National Board of Medical Examiners assume a 35% variation in content between one course and another. Their tests assume that any one school or course teaches about two-thirds of the content covered by their examination, and that for different schools it may be any two-thirds. Furthermore, in the oral examinations, which are testing a derived skill, the application of content to new context, equality of content would not be a critical factor in the evaluation.

PLW/bg

MEDICAL COLLEGE OF GEORGIA

EUGENE TALMADGE MEMORIAL HOSPITAL
AUGUSTA GEORGIA 30902

DEPARTMENT OF OBSTETRICS
AND
GYNECOLOGY

15 May 1963

MEMORANDUM

TO: Mr. Thomas Clemmens

FROM: Doctor P. L. Wilds

SUBJECT: Time to Criterion Records

The time each student invests in learning the subject matter of this study will be recorded in the following manner:

1. Each student will keep his own record (during the nine weeks the students work on constantly changing schedules in two different hospitals).
2. His record will consist of:
   (1) The hours he spends in the lecture series, or working through his programmed text.
   (2) The hours (if any) he spends reading the assigned student text.
   (3) The hours (if any) he spends reading other standard textbook and journal articles on gynecology oncology.
   (4) The number of patients with gynecologic neoplasms assigned to him during his nine week clerkship.
3. Such a record will necessarily be partly clockwork and partly guesswork. The programmed text will contain frequent reminders to record the time. The time for the lecture series will of course be standardized (but not all students will attend all lectures). The time the student spends reading and working with patients with neoplasms will probably be at best crude estimates, but both control and experimental groups will have the same opportunities.

PLW/bg

MEDICAL COLLEGE OF GEORGIA

EUGENE TALMADGE MEMORIAL HOSPITAL
AUGUSTA GEORGIA 30902

DEPARTMENT OF OBSTETRICS
AND
GYNECOLOGY

15 May 1963

MEMORANDUM

TO: Mr. Thomas Clemmens

FROM: Doctor P. L. Wilds

SUBJECT: Criteria for Use of Visual Material in Programmed Text

1. The course content (diagnosis and management of patients with gynecologic neoplasms) is a highly verbal one. At most only a few diagrams and line drawings will be required for supplementation of the verbal text.

2. The lecturer and the programmer will use the same diagrams and line drawings wherever these are necessary to clarify verbal communication.

3. The lecturer, who is a strong proponent of visual aids in classroom teaching, will rely heavily on the projection of verbal material (slogans, outlines, etc.) as part of his lectures. This of course is still verbal presentation.

4. In addition the lecturer will make use of color slides and photographs wherever he feels they might add interest to his presentation. Such use of graphic visual material is not considered an essential part of the learning process.

5. The medical student in his work outside of the classroom is constantly exposed to a barrage of visual tactile and sometimes olfactory aids to learning. Green in his work at Dartmouth has indicated that medical students are as a group highly verbal, and learn essentially verbal material as well without visual supplementation as with.

6. The subject matter of this course is not a suitable one for a comparison of visual versus verbal modes of learning. If there is an advantage in the use of visual material the advantage is with the lecturer rather than with the programmer.

PLW/bg

PROGRAMMED INSTRUCTION TIME SHEET

Date of Course:

Name:____________________ Begin____________________

School:____________________ End____________________

DATE	TIME STARTED	TIME QUIT	TOTAL MINUTES	FIRST FRAME	LAST FRAME

Fill in each session of study. The last frame number will show you where to start next time. Completed time sheets will be turned in at examination session at the end of the course.

A

Student Time Sheet For

GYNECOLOGICAL TUMOR TEACHING

DATE OF COURSE:

Name:______________________________ Beginning:__________

School:______________________________ Ending:__________

	WEEKS	1	2	3	4	5	6	7	8	9	TOTAL
1. Hours* attending lectures or seminars											
2. Hours* reading about gynecological **neoplasms** assigned in text (if any)											
3 Hours* reading other texts or articles in area of gynecological **neoplasms.**											
4. Hours on Programmed text											
	TOTAL										

5. Number of patients with gynecological neoplasms assigned to you:

New______ Old______

* Estimate hours to nearest ¼ hour each week. This sheet to be turned in at end of course.

B

APPENDIX G

ATTITUDE SURVEY FOR ESSENTIALS OF GYNECOLOGIC ONCOLOGY

THE Z-W "PROGRAMMED INSTRUCTION" ATTITUDE SURVEY

Virginia Zachert, Ph.D., and Lea Wilds, M.D.
Medical College of Georgia, Augusta, Georgia

INSTRUCTIONS: **To be filled out when the Programmed Instruction course is completed.** The help of those who have studied this program is needed in order to revise it. Will you please give your honest opinion. It is not necessary that you sign this form. Listed below are statements followed by five descriptive alternatives. Please circle the number that best indicates your reaction to the statement. Please read each choice before making a choice.

1. Before I began this programmed text, my feeling about such texts was one of

1	2	3	4	5
strong approval	approval	neutral—no opinion	disapproval	strong disapproval

2. About halfway through the programmed text I felt that the programmed learning method was

1	2	3	4	5
excellent	very good	all right	poor	completely unacceptable

3. Now that I have completed the course, I think this form of programmed teaching is

1	2	3	4	5
excellent	very good	all right	poor	completely unacceptable

4. Compared to MOST teaching methods I have encountered, this form of instruction is

1	2	3	4	5
far superior	better	about same	inferior	extremely inferior

5. This method of study, compared to other methods of instruction usually encountered, is

1	2	3	4	5
very much easier	easier	no different	more difficult	very much more difficult

6. I feel my study time spent on this programmed course was

1	2	3	4	5
used very profitably	well used	adequately spent	poorly used	largely wasted

7. The programmed material was intellectually challenging

1	2	3	4	5
throughout	most of the time	sometimes	infrequently	very rarely

8. I looked ahead before I wrote my answers

1	2	3	4	5
on no occasion	rarely	sometimes	often	nearly every time

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C

9. I was sure of my answer

1	2	3	4	5
nearly every time	most of the time	sometimes	seldom	almost never

10. I checked and re-wrote my answers

1	2	3	4	5
always	usually	sometimes	seldom	never

11. Writing out the answers in the book (rather than just thinking about them) is

1	2	3	4	5
most valuable	helpful	all right	not very helpful	wasted effort

12. Class or group discussions would have been

1	2	3	4	5
most helpful	helpful	all right	not very helpful	worthless

13. The format of the pages in the programmed text is

1	2	3	4	5
very good	good	all right	not very good	bad

14. The explanations in this program are

1	2	3	4	5
excellent	good	acceptable	inadequate	totally inadequate

15. The illustrations are

1	2	3	4	5
excellent	good	all right	poor	worthless

16. In coverage of the subject, the programmed course is

1	2	3	4	5
much too detailed	a little too detailed	about right	a little too brief	far too brief

17. In teaching me to apply my knowledge to my patients this program I expect will be

1	2	3	4	5
very valuable	valuable	all right	of little help	of no help

18. The portions of the subject indicated by the title of the course were taught by the program

1	2	3	4	5
extremely effectively	very capably	acceptably	inadequately	very poorly

19. For some other medical subjects I would choose programmed instruction

1	2	3	4	5
in preference to all other forms	with approval	maybe	with hesitation	only as last resort

D

20. Programmed instruction, if widely and appropriately used in the medical field, would

1	2	3	4	5
vastly improve the instruction	be good	not hurt anything	be bad	ruin it

21. If this text were available in a bookstore I would recommend that others

1	2	3	4	5
buy it and use it frequently	buy it and use it occasionally	borrow but don't buy it	accept it as gift only	avoid it completely

22. This programmed course presented vocabulary problems for which I had to use a medical dictionary

1	2	3	4	5
not at all	very little	some	often	very often

23. In covering the subject matter in this programmed text, I also read the same material in other texts

1	2	3	4	5
nearly always	usually	sometimes	rarely	not at all

24. How confident are you about your knowledge of the subjects covered in the programmed text?

1	2	3	4	5
very sure	moderately sure	fairly sure	somewhat doubtful	very unsure

COMMENTS AND SUGGESTIONS

A. Things you liked about this programmed course:

1.______________________________

2.______________________________

3.______________________________

4.______________________________

B. Things you disliked about this programmed course:

1.______________________________

2.______________________________

3.______________________________

4.______________________________

C. Changes that you think should be made to improve the programmed text:

1. ____________________

2. ____________________

3. ____________________

4. ____________________

D. How do you think programs such as this could be of most value to the medical profession?

____

____

E. What techniques of presenting information have you found most valuable for acquiring medical knowledge?

____

____

F. Did you find areas in the programmed course that were:

YES NO

☐ ☐ (1) Not discussed to your satisfaction? What? ____________________

☐ ☐ (2) Not covered in adequate detail? What? ____________________

☐ ☐ (3) Covered in too much detail? What? ____________________

G. While going through the program or in reviewing did you feel the need for

YES NO

☐ ☐ (1) A detailed table of contents? When? Why? ____________________

☐ ☐ (2) A detailed index? When? Why? ____________________

☐ ☐ (3) Better note-taking format? When? Why? ____________________

F

YES	NO	
☐	☐	(4) Glossary? When? Why? ______________
☐	☐	(5) A review section? When? Why? ______________
☐	☐	(6) Other? When? Why? ______________

H. List of other medical subjects that might be programmed:

I. Other comments:

J. Are you

(a) Medical student, if so what year? ______________

(b) General practicer, if so, for how many years? ______________

(c) Specialist, if so what? ______________

(d) Other? ______________

K. How did you obtain a copy of this book? ______________

L. Why did you complete it? ______________

M. How many hours did it take you to complete the course? ______________

N. Title of this program ______________

Signature______________
(Optional)

Date______________

G

APPENDIX H

REQUIREMENTS OF COURSE

REQUIREMENTS OF COURSE

Introduction

The following outline attempts to define the verbal knowledge and skills in gynecologic oncology which a medical student should be able to demonstrate after an adequate course of study. This course of study is assumed to include clinical experience in the care of patients. The outline which follows is a consensus of the opinions of the faculty members of the Department of Obstetrics and Gynecology of the Medical College of Georgia. It represents the teaching aims of the department without regard to the restrictions imposed by time, by the limited availability of facilities and patients, and by the personal limitations of students and faculty members. Many of the requirements specified in this outline are beyond the scope of this programmed text but are not necessarily beyond the scope of programmed instruction as a method. This outline is not presented as a set of behavioral objectives for the programmed text which follows. Instead, it is offered as a guide to students of what faculty members may expect of them at the conclusion of a course of study in this subject.

At the completion of the course, students should be able, when presented with actual patients, or with case histories with verbal descriptions: (1) to suggest an appropriate tentative diagnosis and/or differential diagnosis, (2) to outline the steps necessary to reach a definitive diagnosis, and (3) to outline therapy suitable to the lesion and its extent, for the specific gynecologic neoplasms in the following groups:

1. Tumors of the Lower Genital Tract
2. Tumors or Lesions of the Cervix
3. Lesions of the Uterine Corpus
4. Adnexal Tumors

I. Tumors of the Lower Genital Tract.

A. Cystic Tumors

(1) Inclusion cysts of thevulva and vagina
(2) Embryonal remnants, such as Gartner's duct cyst, and cysts of the canal of Nuck (vulvar hydrocele)
(3) Glandular cysts, Bartholin cyst, endometrioma, hydradenoma, and sebaceous cyst.

B. Solid Tumors

(1) Epithelial origin: condyloma accuminata, papilloma, urethral caruncle, nevus
(2) Supporting tissue origin: fibroma and/or leiomyofibroma, hemangioma and lymphangioma.
(3) Granuloma-like: syphilis, chancroid, granuloma inguinale, lymphopathia venereum.

C. Malignant Neoplasms

(1) Carcinomas, primary, secondary

(a) Intra-epithelial, Bowen's disease
(b) Invasive carcinoma of vulva, vagina

(2) Sarcomas . . . Sarcoma Botryoides

For each of the lesions in the above outline, the student should be able to state the incidence (rare or common), age distribution (decade-or-decades in which the lesion is most common), causative agent (if known), pathology (gross and microscopic), malignant potential (if any), method of spread (if any).

The student should be able to write an appropriate request for laboratory aids to confirm his diagnosis. For example, for Gartner's duct cyst (small, asymptomatic) studies needed: none; for a nevus: excision biopsy; for an ulcerative vulvar lesion: biopsy, scraping smears for Ducrey and Donovan bodies, dark-field examination, Frei test, STS, etc. He should be able to write out the International Classification for staging of cancer of the vagina and to describe in general terms, the therapy for any stage of vaginal and vulvar cancer.

II. Lesions of the Cervix.

  A. Ectropion or eversion

  B. Endocervical polyps

  C. Dysplastic lesions

  D. Pre-invasive cancer

  E. Invasive cancer

    (1) Squamous

    (2) Adenocarcinoma

    (3) Other (sarcoma, etc.)

For each of the above lesions the student should be able to state the relative frequency (as compared with other pelvic lesions), age distribution (decades of peak incidence), pathogenesis (if known), and gross and microscopic appearance.

He should be able to specify the applications and limitations of cytology in screening for cervical cancer, and be able to specify which of the above lesions may exfoliate suspicious or positive cells and under what circumstances "false positive" and "false negative" cytologic studies occur. He should write out the Papanicolaou Classification and be able to outline the appropriate diagnostic steps (repeat smear, punch biopsy, endocervical curettage, cone biopsy) for any class smear for a patient in any age group of any parity and at any stage of gestation. The student is *not* expected to have a detailed knowledge of the technical problems of collecting, processing and interpreting cytologic smears.

For any of the above listed cervical lesions, the student should be able to outline a program of therapy (if any is needed). For cancer of the cervix he should be able to write out the International Classification for staging and to outline therapy for each of the five stages. He should also state for each stage the approximate survival rates he might expect. He must clearly distinguish between the therapy of pre-invasive and invasive lesions. For invasive lesions he should be able to list the objectives and hazards of both surgical and irradiation therapy. For irradiation therapy, he should list what information is necessary to evaluate the adequacy of treatment. He should be able to diagram the expected spread of the lesion and be able to name the structures which must be removed or irradiated in treating invasive cancer. For neither surgical nor irradiation therapy is he expected to have a detailed knowledge of the technical problems involved.

III. Lesions of the Uterine Corpus.

A. Uterine fibroids

B. Carcinoma of the endometrium

C. Uterine sarcomas

D. Endometriosis

The student should state the comparative incidence, age distribution (by decades), pathogenesis, gross and microscopic appearance, and signs and symptoms (if any) of the above lesions.

The student should be able to describe the signs and symptoms most frequently associated with fibroids in various anatomical locations (submucous, intramural, subserous, intraligamentary, etc.). He should be able to list the indications for surgical intervention in the management of fibroids. This should include an enumeration of the various degenerative changes and a statement of the malignant potential of this neoplasm. He should be able to outline the differential diagnosis and management of fibroids and/or pregnancy and/or ovarian tumors and/or other pelvic masses, and for each of these should be able to specify the steps required in arriving at a definitive diagnosis.

The student should be able to specify the steps involved in establishing or ruling out the diagnosis of endometrial carcinoma in patients with abnormal uterine bleeding. He should state appropriate indications (if any) for: (1) cytologic screening, (2) endometrial suction biopsy, and (3) dilatation and curettage as they apply to patients with abnormal uterine bleeding.

He should list pathologic criteria for establishing a microscopic diagnosis for cancer of the endometrium (as compared to benign hyperplastic lesions), should specify how inadequate sampling and/or misuse of frozen section can lead to errors in diagnosis in borderline cases. He should be able to write out the staging of endometrial carcinoma, and state the approximate five year survival rate for this disease. He should be able to diagram the mode of spread of endometrial carcinoma and adenoacanthoma and should outline the principles of surgical, irradiation, and endocrine therapy of endometrial cancer, stage by stage.

The student should distinguish between leiomyosarcomas arising from uterine fibroids, and other uterine sarcomas, such as mixed mesodermal tumor and endometrial stromal sarcoma, with regard to incidence and (as compared with carcinomas) mode of spread and prognosis.

The student should specify the important differences and similarities between external endometriosis and adenomyosis with regard to incidence, age distribution, pathogenesis, gross and microscopic pathology, signs, symptoms, and therapy. He should name and describe the classic explanations for the spread of this tumor. He should list the characteristic symptoms and physical findings in both early and far-advanced forms of the disease and should be able to explain how the hormonal dependency of this neoplasm can be used in diagnosis and therapy. He should state the malignant potential of this neoplasm. In cases with an established diagnosis, he should outline appropriate therapy: expectant, medical (including endocrine) and surgical. For the surgical approach he should state the objectives and limitations of both conservative and radical (ablative) therapy.

IV. Adnexal Tumors

A. Non-neoplastic cysts of ovary

(1) Follicular cysts

(2) Lutein cysts

(3) Germinal inclusion cysts

(4) Endometrial cysts

B. Benign neoplasms of the ovary

(1) Cysts

(a) serous cystadenoma
(b) pseudomucinous cystadenoma
(c) dermoid cysts

(2) Solid Tumors

(a) fibroma and related tumors of supporting structures
(b) Brenner tumor
(c) adrenal tumor
(d) hilus tumor

C. Ovarian cancer

(1) Primary cystic carcinomas

(a) serous cystadenocarcinoma
(b) pseudomucinous cystadenocarcinoma
(c) squamous cell carcinoma arising in a dermoid cyst

(2) Solid cancer

- (a) adenocarcinoma of the ovary (various forms)
- (b) dysontogenetic tumors, dysgerminoma, granulosa cell carcinoma, thecoma and luteoma, arrhenoblastoma
- (c) primary teratomas, including choriocarcinoma and struma ovarii
- (d) metastatic carcinoma, Krukenberg's tumor, adenocarcinoma, squamous cell carcinoma, choriocarcinoma, etc.
- (e) ovarian sarcoma

D. Carcinoma of the fallopian tube

E. Hydatidiform mole and choriocarcinoma

The student should list the expected signs and symptoms (if any) of any ovarian tumor, such as: pressure symptoms, pain, ascites (also hydrothorax as in Meigs' syndrome) and disturbed endocrine function. He should list the complications of ovarian tumors, such as hemorrhage into a cyst, torsion, infection, rupture, malignant change. In the differential diagnosis of ovarian vs. other tumors of pelvic origin and those of extrapelvic origin, the student should be able to outline the steps he would take in reaching a definite diagnosis, including the use of such aids to diagnosis as examination under anesthesia and special x-ray studies in establishing the ovarian nature of a pelvic mass. After reaching a tentative preoperative diagnosis of an ovarian tumor the student should be able to use information given about the age of the patient, pain, size of the tumor, contour, consistency, mobility, location, presence of ascites and evidence of endocrine function in reaching an acceptable initial diagnosis. From the gross description of an ovarian tumor, the student should be able to list the common diagnostic possibilities.

In outlining the management of patients with ovarian masses, the student should be able to apply principles such as the following:

1. Small asymptomatic non-neoplastic cysts require observation but not surgical intervention.

2. All neoplastic tumors, cystic and solid, should be removed. Dermoid cysts may be shelled out; other benign neoplasms usually require oophorectomy with care being taken not to rupture the cyst. In all cases the opposite ovary should be inspected and usually bisected.

3. Treatment of ovarian malignancy should follow established policies.

The student should specify the frequency, age incidence, and symptoms (if any) of tubal malignancies, and should describe treatment and prognosis in the same general terms as for an ovarian malignancy.

Hydatidiform mole and choriocarcinoma, being of placental origin, are not included in this course on gynecologic neoplasms except as items in differential diagnosis.

x

APPENDIX I

LISTING OF DATA ON 1963-64 MEDICAL COLLEGE OF GEORGIA JUNIOR STUDENT MCATS, RANK IN CLASS, GRADE-POINT AVERAGES, AND ORALS BY EXPERIMENTAL AND CONTROL GROUPS

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Listing of Data on 1963-64 Medical College of Georgia Junior Student MCATS, Rank in Class, Grade-Point Averages, and Orals

Control Group A

STUDENT	MCATS				RANK	GPA	ORALS
	V	Q	GI	Sci			
1. A	66	66	67	64	25	2.80	3
2. A	43	51	48	52	86	1.88	2
3. C	38	59	48	65	31	2.60	2
4. C	50	59	38	51	39	2.37	2
5. C	32	40	38	45	58	2.19	1
6. D	35	41	43	42	44	2.34	2
7. E	50	48	56	51	46	2.33	0
8. E	45	47	47	43	39	2.37	2
9. G	41	63	42	55	31	2.60	3
10. G	45	37	46	35	79	2.04	2
11. G	49	58	44	56	6	3.19	2
12. H	56	45	51	39	37	2.39	3
13. H	55	45	63	60	75	2.06	2
14. K	44	42	37	46	29	2.65	3
15. L	56	45	43	52	35	2.51	1
16. L	57	64	53	62	50	2.28	4
17. M	48	52	56	51	25	2.80	3
18. M	54	51	55	68	70	2.09	1
19. N	44	45	45	49	89	1.75	1
20. R	43	40	47	45	18	2.94	3
21. S	43	53	35	48	43	2.36	1
22. W	40	60	42	56	20	2.92	1
23. W	47	38	49	47	57	2.20	2

Listing of Data on 1963-64 Medical College of Georgia Junior Student MCATS, Rank in Class, Grade-Point Averages, and Orals

Control Group A'

STUDENT		MCATS			RANK	GPA	ORALS
	V	Q	GI	Sci*			
1. A	36	47	43	47	78	2.05	1
2. A	45	49	39	50	31	2.63	2
3. B	47	55	36	45	82	2.03	2
4. C	49	58	45	58	87	1.83	3
5. H	37	52	50	48	44	2.34	1
6. H	47	44	56	49	65	2.11	3
7. H	45	52	49	50	19	2.93	3
8. J	43	47	40	33	79	2.04	3
9. K	41	47	37	46	11	3.05	1
10. H	59	65	53	54	52	2.26	2
11. M	64	48	49	48	59	2.16	2
12. M	66	54	71	63	36	2.40	2
13. O	57	52	45	52	1	3.75	3
14. O	64	38	61	48	65	2.10	0
15. P	54	56	52	55	72	2.08	3
16. R	54	53	57	51	13	2.98	2
17. S	38	48	40	39	53	2.25	1
18. S	47	51	54	47	15	2.96	2
19. S	62	57	70	57	37	2.39	2
20. S	42	47	46	45	16	2.95	3
21. V	51	58	40	43	22	2.90	2
22. W	52	57	51	58	28	2.69	2

Listing of Data on 1963-64 Medical College of Georgia Junior Student MCATS, Rank in Class, Grade-Point Averages, and Orals

Experimental Group B

STUDENT		MCATS				RANK	GPA	ORALS
		V	Q	GI	Sci			
1.	A	65	49	63	44	10	3.07	3
2.	B	39	48	48	45	73	2.07	3
3.	B	35	47	44	43	39	2.37	4
4.	C	63	61	70	58	16	2.95	2
5.	C	62	45	61	52	7	3.16	3
6.	D	44	41	42	47	49	2.29	2
7.	D	52	50	52	48	70	2.09	2
8.	D	50	53	51	53	9	3.12	3
9.	F	48	44	55	52	1	3.75	4
10.	H	53	62	62	46	79	2.04	3
11.	H	51	56	41	45	61	2.14	2
12.	J	47	60	52	49	73	2.07	1
13.	J	59	55	51	57	39	2.37	3
14.	M	45	48	37	49	50	2.28	2
15.	M	48	62	37	58	33	2.52	2
16.	P	48	51	50	51	69	2.10	4
17.	P	43	51	56	49	85	2.00	1
18.	R	44	50	51	48	53	2.25	4
19.	S	37	41	49	57	12	3.00	2
20.	T	44	45	50	49	65	2.11	2
21.	T	35	42	34	41	53	2.25	2
22.	T	39	54	39	44	26	2.70	4
23.	T	44	41	45	44	62	2.13	1
24.	W	62	58	57	60	29	2.65	3

Listing of Data on 1963-64 Medical College of Georgia Junior Student MCATS, Rank in Class, Grade-Point Averages, and Orals

Experimental Group B'

STUDENT	MCATS				RANK	GPA	ORALS
	V	Q	GI	Sci			
1. B	46	33	41	54	62	2.13	2
2. B	49	61	48	50	4	3.51	1
3. C	47	43	55	41	21	2.91	2
4. C	46	38	43	49	53	2.25	2
5. D	41	44	43	31	59	2.16	1
6. D	55	52	56	58	90	1.27	1
7. F	48	51	45	41	57	2.20	1
8. F	53	34	59	43	75	2.06	2
9. F	35	36	40	48	32	2.59	1
10. G	42	40	36	47	47	2.30	2
11. H	52	52	54	58	65	2.11	2
12. K	62	41	51	46	8	3.13	3
13. M	66	61	60	62	75	2.06	1
14. M	34	52	36	32	64	2.12	2
15. M	35	52	39	44	23	2.88	2
16. R	64	65	74	56	33	2.52	3
17. S	54	50	54	48	25	2.80	2
18. S	64	64	52	65	84	2.02	1
19. S	54	45	53	59	36	2.49	0
20. S	50	58	61	56	13	2.98	2
21. W	48	47	44	50	48	2.29	2
22. W	40	41	37	41	24	2.87	3

APPENDIX J

LISTING OF DATA ON 1964-65 MEDICAL COLLEGE OF GEORGIA JUNIOR STUDENT MCATS, RANK IN CLASS, GRADE-POINT AVERAGES, AND ORALS BY EXPERIMENTAL AND CONTROL GROUPS

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Listing of Data on 1964-65 Medical College of Georgia Junior Student MCATS, Rank in Class, Grade-Point Averages, and Orals

Control Group A

STUDENT	MCATS				RANK	GPA	ORALS
	V	Q	GI	Sci			
1. B	39	43	47	45	68	2.24	1
2. B	54	44	49	51	56	2.28	2
3. B	52	52	51	46	57	2.27	4
4. C	49	57	50	56	31	2.72	0
5. C	49	57	47	55	26	2.76	1
6. C	57	48	53	46	80	2.01	0
7. D	35	43	32	42	70	2.15	1
8. F	35	39	42	40	57	2.27	2
9. F	49	41	48	43	38	2.58	2
10. G	53	51	49	50	57	2.27	1
11. G	40	53	37	54	74	2.02	2
12. G	50	54	43	46	66	2.25	1
13. G	51	51	50	50	57	2.27	1
14. H	57	63	54	62	8	3.04	2
15. K	51	40	53	51	55	2.30	2
16. L	50	52	45	49	1	3.68	3
17. M	48	41	53	41	43	2.55	2
18. M	47	56	45	51	74	2.02	1
19. R	39	43	45	39	43	2.55	3
20. R	41	43	55	41	25	2.77	1
21. S	45	63	47	50	21	2.83	2
22. S	63	36	57	59	2	3.58	3
23. W	43	36	40	39	18	2.86	3
24. W	54	45	55	50	9	3.01	2

Listing of Data on 1964-65 Medical College of Georgia Junior Student MCATS, Rank in Class, Grade-Point Averages, and Orals

Control Group A'

STUDENT		MCATS				RANK	GPA	ORALS
		V	Q	GI	Sci			
1.	C	42	36	51	48	74	2.02	2
2.	C	46	50	51	59	57	2.27	1
3.	E	48	47	48	40	88	1.96	1
4.	F	39	54	39	43	33	2.63	3
5.	G	53	43	55	45	36	2.61	3
6.	H	63	50	58	45	74	2.02	0
7.	K	52	52	58	46	18	2.86	2
8.	M	47	53	47	45	69	2.20	3
9.	M	33	51	47	55	7	3.07	3
10.	M	54	47	67	52	29	2.73	1
11.	N	40	39	55	33	80	2.01	2
12.	P	35	35	43	37	45	2.52	3
13.	R	47	36	45	48	13	2.94	2
14.	R	41	43	44	41	57	2.27	3
15.	R	36	41	47	45	33	2.63	2
16.	R	45	52	48	48	80	2.01	1
17.	S	51	52	48	54	11	2.96	4
18.	V	48	44	50	63	73	2.04	0
19.	W	40	49	44	31	32	2.66	3
20.	W	53	51	50	47	37	2.59	4
21.	W	59	57	39	52	65	2.11	2

Listing of Data on 1964-65 Medical College of Georgia Junior Student MCATS, Rank in Class, Grade-Point Averages, and Orals

Experimental Group B

STUDENT	MCATS				RANK	GPA	ORALS
	V	Q	GI	Sci			
1. C	43	50	47	40	72	2.07	2
2. D	33	53	38	49	52	2.38	3
3. G	53	52	51	54	18	2.86	3
4. G	61	66	60	56	42	2.56	2
5. H	43	36	40	48	29	2.73	1
6. H	51	56	43	45	90	1.69	2
7. J	49	49	54	49	6	3.14	4
8. J	43	36	52	42	84	2.00	1
9. K	47	52	57	50	23	2.79	2
10. L	37	49	41	50	86	1.99	3
11. M	57	54	59	47	74	2.02	3
12. M	49	52	44	45	15	2.90	2
13. M	47	47	48	56	74	2.02	2
14. M	54	62	54	43	35	2.62	3
15. M	46	44	48	43	41	2.57	1
16. N	44	45	45	45	49	2.41	1
17. O	42	36	37	38	47	2.50	3
18. Q	43	44	46	48	57	2.27	3
19. S	53	49	39	51	49	2.41	3
20. S	53	37	45	54	4	3.34	3
21. S	41	49	39	41	84	2.00	3
22. W	56	72	59	63	3	3.46	3
23. W	53	41	42	45	57	2.27	2
24. W	49	53	46	55	28	2.75	1

Listing of Data on 1964-65 Medical College of Georgia Junior Student MCATS, Rank in Class, Grade-Point Averages, and Orals

Experimental Group B'

STUDENT	MCATS				RANK	GPA	ORALS
	V	Q	GI	Sci			
1. A	43	47	44	51	16	2.88	4
2. A	49	51	44	49	87	1.97	2
3. B	56	56	58	67	12	2.95	3
4. B	61	46	50	39	57	2.27	0
5. C	55	51	59	50	48	2.43	1
6. D	54	45	49	58	66	2.25	1
7. E	44	49	54	47	91	1.66	2
8. H	70	63	50	71	10	3.00	3
9. H	44	39	52	42	22	2.82	3
10. K	42	48	54	54	45	2.52	2
11. K	31	33	53	44	16	2.88	4
12. M	45	42	46	40	38	2.58	1
13. M	46	58	52	52	24	2.78	1
14. N	45	36	42	45	5	3.16	2
15. S	59	63	58	54	80	2.01	2
16. S	37	48	42	39	54	2.31	2
17. S	64	64	52	65	84	2.02	4
18. S	32	32	40	43	38	2.58	4
19. S	49	48	45	51	49	2.41	1
20. S	55	41	43	44	26	2.76	4
21. T	50	49	50	51	53	2.33	2
22. W	47	52	47	49	71	2.14	1
23. W	48	26	41	42	88	1.96	3

APPENDIX K

LISTING OF DATA ON STUDENTS FROM THE FOLLOWING MEDICAL SCHOOLS

University of North Carolina School of Medicine
University of Nebraska College of Medicine
University of Iowa School of Medicine

MCATS, RANK IN CLASS, AND GRADE-POINT AVERAGES

BY EXPERIMENTAL AND CONTROL GROUPS

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Listing of Data on University of North Carolina Senior Student
MCATS, Rank in Class, and Grade-Point Averages

Control Group

STUDENT	MCATS				RANK	GPA
	V	Q	GI	Sci		
1. C	38	39	37	38	53	1.26
2. G	57	57	48	53	9	2.98
3. G	47	59	46	53	12	2.86
4. G	45	54	53	55	29	1.88
5. H	40	62	49	46	8	3.01
6. H	43	48	47	55	62	.98
7. M	49	56	48	49	21	2.33
8. P	63	63	52	62	7	3.10
9. P	62	62	50	51	23	2.27
10. R	49	58	57	51	51	1.27

Listing of Data on University of North Carolina Senior Student MCATS, Rank in Class, and Grade-Point Averages

Experimental Group

STUDENT		MCATS				RANK	GPA
		V	Q	GI	Sci		
1.	A	55	51	62	62	30	1.87
2.	B	45	42	43	46	36	1.64
3.	B	52	44	40	48	45	1.43
4.	F	48	59	40	42	6	3.14
5.	G	60	64	62	62	1	3.54
6.	H	45	47	41	42	49	1.35
7.	H	59	55	60	41	3	3.34
8.	J	59	34	47	50	59	1.06
9.	J	45	51	48	48	63	.93
10.	L	49	49	37	45	40	1.53
11.	M	44	40	41	53	48	1.10
12.	M	45	41	52	45	44	1.49
13.	M	50	45	42	52	18	2.46
14.	S	53	41	63	46	19	2.35
15.	B	46	51	57	62	48	1.36
16.	B	41	48	48	37	60	1.05
17.	C	71	72	66	60	5	3.18
18.	D	57	68	55	74	16	2.51
19.	E	48	56	43	45	30	1.87
20.	G	43	41	42	46	55	1.19
21.	G	46	55	50	51	27	2.08
22.	H	53	64	61	51	33	1.75
23.	L	47	56	55	55	37	1.55
24.	L	65	50	63	68	38	1.54
25.	M	54	55	47	53	59	3.14
26.	M	43	38	41	49	54	1.22
27.	P	57	46	53	51	13	2.75
28.	S	59	51	58	54	11	2.91
29.	S	44	55	46	39	22	2.30
30.	W	64	70	49	56	24	2.23

Listing of Data on University of Nebraska Junior Student MCATS and Rank in Class

Control Group 1

STUDENT		MCATS V	MCATS Q	MCATS GI	MCATS Sci	RANK
1.	R	41	50	40	50	29
2.	R	56	54	55	58	46
3.	R	46	47	53	42	75
4.	R	45	48	40	56	12
5.	R	49	38	41	55	36
6.	R	57	66	59	44	40
7.	S	51	53	52	45	66
8.	S	46	52	50	52	--
9.	S	33	52	42	40	57
10.	S	47	57	47	46	25

Listing of Data on University of Nebraska Junior Student MCATS and Rank in Class

Control Group 2

STUDENT	MCATS				RANK
	V	Q	GI	Sci	
1. A	48	40	50	45	65
2. A	39	56	52	58	70
3. B	41	52	47	53	13
4. B	45	48	51	46	29
5. B	52	56	50	54	71
6. B	46	58	56	57	28
7. B	51	39	53	48	--
8. B	58	66	61	68	29
9. B	62	53	49	55	33

Listing of Data on University of Nebraska Junior Student
MCATS and Rank in Class

Control Group 3

STUDENT		MCATS				RANK
		V	Q	GI	Sci	
1.	F	53	46	57	62	44
2.	F	59	56	59	52	48
3.	F	43	50	43	52	69
4.	G	61	50	57	58	6
5.	G	51	49	62	51	44
6.	G	59	50	60	46	62
7.	G	60	52	54	53	6
8.	G	59	47	59	50	--
9.	H	56	54	64	64	8

Listing of Data on University of Nebraska Junior Student MCATS and Rank in Class

Control Group 4

STUDENT	MCATS				RANK
	V	Q	GI	Sci	
1. K	59	44	65	58	54
2. K	63	61	52	51	17
3. K	55	54	48	48	2
4. K	50	56	55	52	67
5. L	65	70	66	68	17
6. L	64	65	68	56	--
7. L	67	54	61	39	39
8. L	36	45	50	52	--
9. M	54	45	63	56	10
10. M	36	35	50	47	--

Listing of Data on University of Nebraska Junior Student MCATS and Rank in Class

Experimental Group 1

STUDENT		MCATS				RANK
		V	Q	GI	Sci	
1.	S	60	50	51	54	15
2.	S	61	67	58	60	57
3.	S	58	52	67	59	55
4.	T	42	45	47	44	51
5.	T	43	46	55	45	74
6.	T	57	59	48	51	42
7.	T	52	62	45	52	17
8.	W	44	51	51	59	4
9.	W	57	50	54	53	71
10.	W	35	43	38	40	36

Listing of Data on University of Nebraska Junior Student MCATS and Rank in Class

Experimental Group 2

STUDENT	MCATS				RANK
	V	Q	GI	Sci	
1. C	47	52	51	55	26
2. E	56	57	64	55	57
3. D	57	43	38	50	10
4. C	35	50	42	47	40
5. D	51	57	62	57	51
6. D	64	59	71	59	33
7. C	51	58	48	54	68
8. E	44	55	53	45	71
9. C	51	42	52	47	22
10. C	43	42	44	43	55

Listing of Data on University of Nebraska Junior Student MCATS and Rank in Class

Experimental Group 3

STUDENT		MCATS				RANK
		V	Q	GI	Sci	
1.	H	63	66	63	71	1
2.	H	54	48	58	59	21
3.	H	41	53	48	56	50
4.	H	52	52	61	40	49
5.	H	43	49	43	49	51
6.	H	56	52	54	46	35
7.	H	64	55	64	56	63
8.	H	50	56	47	50	--
9.	J	37	41	52	44	15
10.	J	49	64	54	44	--

Listing of Data on University of Nebraska Junior Student MCATS and Rank in Class

Experimental Group 4

STUDENT	MCATS				RANK
	V	Q	GI	Sci	
1. M	47	46	55	48	36
2. M	48	46	60	56	3
3. M	49	51	54	46	8
4. N	37	42	41	38	--
5. N	48	50	43	48	47
6. N	64	66	61	60	5
7. P	44	56	49	52	20
8. P	54	48	49	51	--
9. P	39	56	60	43	61

Listing of Data on University of Iowa Junior Student MCATS and Grade-Point Averages

Control Group 1

STUDENT		MCATS				GPA
		V	Q	GI	Sci	
1.	G	67	64	69	57	3.06
2.	K	61	56	64	59	2.90
3.	K	53	44	46	51	2.73
4.	K	49	59	53	52	3.34
5.	P	56	54	59	65	3.53
6.	W	47	64	53	61	3.16
7.	W	53	56	54	52	2.89
8.	W	53	63	51	56	3.15
9.	W	47	50	54	55	2.90
10.	W	46	48	51	46	2.91

Listing of Data on University of Iowa Junior Student MCATS and Grade-Point Averages

Control Group 2

STUDENT		MCATS				GPA
		V	Q	GI	Sci	
1.	B	61	60	61	58	3.38
2.	B	39	40	59	40	3.26
3.	B	48	54	51	53	3.19
4.	G	41	39	60	52	3.40
5.	G	48	54	42	55	3.02
6.	H	55	58	54	51	3.41
7.	H	45	67	44	53	3.35
8.	T	45	59	48	51	3.00
9.	W	63	46	64	54	3.26
10.	W	44	49	50	51	2.95
11.	W	61	54	56	48	3.03
12.	W	54	57	55	60	2.73
13.	W	50	56	61	60	3.45

Listing of Data on University of Iowa Junior Student MCATS and Grade-Point Averages

Control Group 3

STUDENT		MCATS				GPA
		V	Q	GI	Sci	
1.	B	42	57	46	42	3.25
2.	B	49	59	60	65	3.16
3.	B	60	66	63	69	3.95
4.	B	55	61	63	64	3.93
5.	B	60	66	63	65	3.94
6.	B	48	48	63	53	3.05
7.	C	53	58	54	56	2.80
8.	D	45	45	57	53	3.19
9.	D	64	52	61	46	3.10
10.	F	49	63	49	41	3.42
11.	F	47	60	49	58	3.13

Listing of Data on University of Iowa Junior Student MCATS and Grade-Point Averages

Control Group 4

STUDENT	MCATS				GPA
	V	Q	GI	Sci	
1. C	59	62	62	58	2.84
2. D	50	63	58	49	2.93
3. E	68	58	56	57	3.69
4. F	64	65	61	69	3.13
5. F	49	52	50	48	2.69
6. K	37	38	44	40	2.93
7. L	53	54	47	52	2.62
8. M	49	54	50	59	2.63
9. M	46	59	46	57	3.12
10. M	49	55	50	66	3.51

Listing of Data on University of Iowa Junior Student MCATS and Grade-Point Averages

Experimental Group 1

STUDENT	MCATS				GPA
	V	Q	GI	Sci	
1. P	52	48	54	47	3.06
2. S	62	52	69	61	3.38
3. S	55	52	52	49	2.99
4. S	42	57	52	54	2.70
5. S	55	48	59	48	2.79
6. S	51	56	47	57	2.52
7. S	57	56	62	57	2.44
8. R	54	47	51	49	2.81
9. W	49	43	56	54	3.27

Listing of Data on University of Iowa Junior Student MCATS and Grade-Point Averages

Experimental Group 2

STUDENT		MCATS				GPA
		V	Q	GI	Sci	
1.	A	47	64	58	70	3.64
2.	B	47	56	50	51	2.73
3.	B	57	66	64	60	3.10
4.	C	55	62	58	70	3.62
5.	F	43	43	56	45	2.82
6.	M	43	57	58	51	2.64
7.	R	49	52	53	52	2.81
8.	S	59	61	67	56	3.08
9.	S	50	68	60	58	3.01
10.	V	55	62	49	56	2.79

Listing of Data on University of Iowa Junior Student MCATS and Grade-Point Averages

Experimental Group 3

STUDENT		MCATS				GPA
		V	Q	GI	Sci	
1.	A	54	58	49	44	2.59
2.	B	49	59	60	67	3.04
3.	C	55	61	55	50	2.67
4.	C	60	57	60	52	2.60
5.	F	43	58	57	52	3.51
6.	G	45	50	60	48	3.74
7.	H	55	64	52	61	3.74
8.	H	57	43	46	44	2.77
9.	H	49	45	47	52	3.02
10.	H	51	54	59	55	2.95
11.	H	62	60	59	65	2.44
12.	K	56	64	56	62	3.69
13.	L	55	47	51	43	3.05

Listing of Data on University of Iowa Junior Student MCATS and Grade-Point Averages

Experimental Group 4

STUDENT	MCATS				GPA
	V	Q	GI	Sci	
1. C	52	58	51	51	2.52
2. F	39	50	65	51	3.08
3. G	47	41	59	60	3.45
4. H	51	64	52	54	2.77
5. H	47	45	44	48	2.98
6. H	50	46	55	59	2.87
7. H	47	54	46	42	3.17
8. H	53	36	49	47	3.75
9. H	49	56	55	61	3.38

APPENDIX L

LISTING OF DATA ON 1963-64 MEDICAL COLLEGE OF GEORGIA JUNIOR STUDENT SCORES ON PRE-TEST AND POST-TEST, GAIN, AND SPECIAL NATIONAL BOARD EXAMINATION IN OB-GYN NEOPLASMS BY EXPERIMENTAL AND CONTROL GROUPS

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Listing of 1963-64 Medical College of Georgia Junior Student Scores on Pre-Test and Post-Test, Gain, and National Board Special Examination

Control Group A

STUDENT	PRE-TEST	POST-TEST	GAIN	1964 NB	1965 NB
1. A	65	94	29	81	81
2. A	47	81	34	70	71
3. C	54	87	33	81	75
4. C	62	93	31	84	85
5. C	48	89	41	75	75
6. D	50	88	38	80	81
7. E	61	83	22	80	75
8. E	59	79	20	--	--
9. G	59	96	37	88	88
10. G	46	71	25	75	72
11. G	50	90	40	77	78
12. H	57	83	26	82	77
13. H	50	82	32	79	78
14. K	48	84	36	83	69
15. L	41	83	42	73	75
16. L	64	92	28	85	81
17. M	55	87	32	87	81
18. M	47	81	34	77	83
19. N	41	65	24	66	75
20. R	52	83	31	81	76
21. S	43	86	43	78	67
22. W	49	67	18	80	76
23. W	49	78	29	79	78

Listing of 1963-64 Medical College of Georgia Junior Student Scores on Pre-Test and Post-Test, Gain, and National Board Special Examination

Control Group A'

STUDENT		PRE-TEST	POST-TEST	GAIN	1964 NB	1965 NB
1.	A	56	80	24	80	68
2.	A	63	89	26	83	75
3.	B	63	80	17	80	67
4.	C	66	84	18	92	86
5.	H	57	91	34	86	81
6.	H	58	87	29	81	78
7.	H	64	93	29	92	75
8.	J	63	78	15	88	75
9.	K	65	82	17	83	77
10.	H	60	76	16	75	70
11.	M	71	83	12	78	65
12.	M	76	84	8	82	78
13.	O	65	91	26	84	78
14.	O	75	92	17	78	70
15.	P	66	87	21	85	79
16.	R	69	89	20	83	76
17.	S	43	78	35	75	64
18.	S	64	97	33	84	79
19.	S	60	94	34	85	79
20.	S	54	87	33	83	75
21.	V	75	88	13	88	84
22.	W	71	93	22	89	77

Listing of 1963-64 Medical College of Georgia Junior Student Scores on Pre-Test and Post-Test, Gain, and National Board Special Examination

Experimental Group B

STUDENT	PRE-TEST	POST-TEST	GAIN	1964 NB	1965 NB
1. A	69	93	24	87	84
2. B	46	79	33	71	78
3. B	48	82	34	75	77
4. C	59	77	18	77	85
5. C	63	85	22	83	78
6. D	60	79	19	77	80
7. D	56	89	33	79	77
8. D	52	81	29	76	71
9. F	56	84	28	81	76
10. H	52	81	29	71	71
11. H	63	88	25	77	76
12. J	53	82	29	77	73
13. J	57	90	33	80	78
14. M	48	79	31	80	73
15. M	55	96	41	83	75
16. P	50	91	41	80	75
17. P	49	83	34	82	75
18. R	55	84	29	82	82
19. S	50	92	42	79	78
20. T	58	86	28	77	72
21. T	67	82	15	81	83
22. T	52	79	27	79	77
23. T	43	75	32	79	70
24. W	71	98	27	90	84

Listing of 1963-64 Medical College of Georgia Junior Student Scores on Pre-Test and Post-Test, Gain, and National Board Special Examination

Experimental Group B'

STUDENT		PRE-TEST	POST-TEST	GAIN	1964 NB	1965 NB
1.	B	54	93	39	79	73
2.	B	60	80	20	81	81
3.	C	64	95	31	86	88
4.	C	44	74	30	77	76
5.	D	49	80	31	72	66
6.	D	56	86	30	75	71
7.	F	51	77	26	80	78
8.	F	68	94	26	80	70
9.	F	60	91	31	78	75
10.	G	66	96	30	83	76
11.	H	45	90	45	80	75
12.	K	57	91	34	84	77
13.	M	54	85	31	67	79
14.	M	45	81	36	75	71
15.	M	64	97	33	75	75
16.	R	51	91	40	85	75
17.	S	75	97	22	78	75
18.	S	64	93	29	78	76
19.	S	62	89	27	79	78
20.	S	62	81	19	78	78
21.	W	60	73	13	81	70
22.	W	46	83	37	86	83

APPENDIX M

LISTING OF DATA ON 1964-65 MEDICAL COLLEGE OF GEORGIA JUNIOR STUDENT SCORES ON PRE-TEST AND POST-TEST, GAIN, AND SPECIAL NATIONAL BOARD EXAMINATION IN OB-GYN NEOPLASMS

BY EXPERIMENTAL AND CONTROL GROUPS

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Listing of 1964-65 Medical College of Georgia Junior Student Scores on Pre-Test and Post-Test, Gain and National Board Special Examination

Control Group A

	STUDENT	PRE-TEST	POST-TEST	GAIN	NB
1.	B	35	79	44	75
2.	B	37	72	35	75
3.	B	50	87	37	75
4.	C	45	79	34	75
5.	C	70	89	19	87
6.	C	52	66	14	71
7.	D	41	57	16	75
8.	F	45	86	41	77
9.	F	39	82	43	79
10.	G	48	89	41	78
11.	G	49	86	37	88
12.	G	37	88	51	77
13.	G	43	73	30	70
14.	H	60	88	28	85
15.	K	59	92	33	86
16.	L	63	91	28	91
17.	M	58	80	22	76
18.	M	57	73	16	75
19.	R	39	82	43	81
20.	R	51	85	34	77
21.	S	53	86	33	76
22.	S	62	95	33	86
23.	W	52	85	33	76
24.	W	55	83	28	81

Listing of 1964-65 Medical College of Georgia Junior Student Scores on Pre-Test and Post-Test, Gain and National Board Special Examination

Control Group A'

STUDENT	PRE-TEST	POST-TEST	GAIN	NB
1. C	48	78	30	80
2. C	51	74	23	79
3. E	46	66	20	80
4. F	56	105	49	89
5. G	53	96	43	88
6. H	52	68	16	81
7. K	59	77	18	85
8. M	62	90	28	81
9. M	59	95	36	82
10. M	49	90	41	84
11. N	48	77	29	80
12. P	55	83	28	77
13. R	55	97	42	84
14. R	50	92	42	78
15. R	54	80	26	81
16. R	59	80	21	82
17. S	66	89	23	90
18. V	47	72	25	80
19. W	52	91	39	84
20. W	54	88	34	80
21. W	47	89	42	87

Listing of 1964-65 Medical College of Georgia Junior Student Scores on Pre-Test and Post-Test, Gain and National Board Special Examination

Experimental Group B

STUDENT		PRE-TEST	POST-TEST	GAIN	NB
1.	C	39	91	52	78
2.	D	44	81	37	83
3.	G	77	93	16	88
4.	G	50	71	21	75
5.	H	48	97	49	80
6.	H	61	79	18	81
7.	J	54	92	38	87
8.	J	43	73	30	75
9.	K	54	98	44	81
10.	L	63	78	15	82
11.	M	44	69	25	82
12.	M	41	93	52	81
13.	M	66	96	30	83
14.	M	50	79	29	81
15.	M	69	81	12	77
16.	N	45	79	34	81
17.	O	60	90	30	81
18.	Q	51	85	34	84
19.	S	65	100	35	91
20.	S	70	101	31	89
21.	S	50	78	28	81
22.	W	75	100	25	96
23.	W	53	80	27	77
24.	W	48	79	31	78

Listing of 1964-65 Medical College of Georgia Junior Student Scores on Pre-Test and Post-Test, Gain and National Board Special Examination

Experimental Group B'

STUDENT	PRE-TEST	POST-TEST	GAIN	NB
1. A	53	84	31	84
2. A	54	64	10	79
3. B	68	79	11	85
4. B	44	76	32	79
5. C	52	86	34	91
6. D	44	89	45	80
7. E	47	73	26	72
8. H	46	95	49	88
9. H	61	90	29	89
10. K	52	84	32	76
11. K	67	97	30	86
12. M	49	92	43	85
13. M	48	78	30	82
14. N	53	90	37	83
15. S	42	88	46	75
16. S	45	73	28	75
17. S	92	89	-3	83
18. S	66	94	28	79
19. S	45	69	24	77
20. S	46	88	42	80
21. T	44	83	39	72
22. W	50	78	28	75
23. W	35	78	43	78

APPENDIX N

LISTING OF DATA ON STUDENTS FROM THE FOLLOWING MEDICAL SCHOOLS

University of North Carolina College of Medicine
University of Nebraska College of Medicine
University of Iowa School of Medicine
University of Vermont College of Medicine
California College of Medicine

SCORES ON PRE-TEST AND POST-TEST, AND GAIN, SPECIAL NATIONAL BOARD EXAMINATION IN

OB-GYN NEOPLASMS

BY EXPERIMENTAL AND CONTROL GROUPS

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Listing of Data From the University of North Carolina Senior Student Scores on Pre-Test, Post-Test, and Gain

Control Group

STUDENT	PRE-TEST	POST-TEST	GAIN
1. C	61	91	30
2. G	72	90	18
3. G	80	83	3
4. G	65	88	23
5. H	75	92	17
6. H	67	86	19
7. B	58	74	16
8. M	66	84	18
9. P	66	83	17
10. P	71	89	18
11. R	66	74	8

Listing of Data From the University of North Carolina Senior Student Scores on Pre-Test, Post-Test, and Gain

Experimental Group

STUDENT	PRE-TEST	POST-TEST	GAIN
1. A	55	92	37
2. B	60	90	30
3. B	61	92	31
4. F	56	94	38
5. G	86	100	14
6. H	46	91	45
7. H	58	91	33
8. J	59	89	30
9. J	48	83	35
10. L	55	91	36
11. M	59	80	21
12. M	61	84	23
13. M	59	87	28
14. S	53	87	34
15. B	58	89	31
16. B	55	86	31
17. C	58	84	26
18. D	64	95	31
19. E	58	81	23
20. G	44	85	41
21. G	62	95	33
22. H	73	93	20
23. L	75	85	10
24. L	67	94	27
25. M	78	94	16
26. M	63	74	11
27. P	85	95	10
28. S	57	98	41
29. S	61	93	32
30. W	67	87	20

Listing of Data from the University of Nebraska Junior Student Scores on Pre-Test, Post-Test, and Gain

Control Group 1

STUDENT	PRE-TEST	POST-TEST	GAIN
1. R	61	78	17
2. R	56	65	9
3. R	61	73	12
4. R	61	70	9
5. R	55	85	30
6. R	57	74	17
7. S	47	81	34
8. S	68	99	31
9. S	49	77	28
10. S	63	80	17

Listing of Data from the University of Nebraska Junior Student Scores on Pre-Test, Post-Test, and Gain

Control Group 2

STUDENT	PRE-TEST	POST-TEST	GAIN
1. A	50	67	17
2. A	37	73	36
3. B	62	78	16
4. B	61	85	24
5. B	46	84	38
6. B	58	74	16
7. B	69	86	17
8. B	64	82	18
9. B	58	77	19

Listing of Data from the University of Nebraska Junior Student
Scores on Pre-Test, Post-Test, and Gain

Control Group 3

STUDENT	PRE-TEST	POST-TEST	GAIN
1. F	50	83	33
2. F	64	83	19
3. F	63	62	-1
4. G	79	83	4
5. G	45	79	34
6. G	48	77	29
7. G	74	81	7
8. G	72	84	12
9. G	65	93	28

Listing of Data from the University of Nebraska Junior Student Scores on Pre-Test, Post-Test, and Gain

Control Group 4

STUDENT		PRE-TEST	POST-TEST	GAIN
1.	K	65	68	3
2.	K	68	81	13
3.	K	79	96	17
4.	K	66	78	12
5.	L	76	89	13
6.	L	65	79	14
7.	L	64	92	28
8.	L	55	69	14
9.	M	87	89	2
10.	M	72	78	6

Listing of Data from the University of Nebraska Junior Student Scores on Pre-Test, Post-Test, and Gain

Experimental Group 1

STUDENT	PRE-TEST	POST-TEST	GAIN
1. H	84	93	9
2. S	58	97	39
3. S	61	90	29
4. S	57	76	19
5. T	65	70	5
6. T	52	89	37
7. T	61	82	21
8. T	59	94	35
9. W	58	97	39
10. W	65	88	23
11. W	48	82	34

Listing of Data from the University of Nebraska Junior Student Scores on Pre-Test, Post-Test, and Gain

Experimental Group 2

STUDENT	PRE-TEST	POST-TEST	GAIN
1. C	63	69	6
2. E	58	75	17
3. D	67	94	27
4. C	51	80	29
5. D	57	86	29
6. D	71	84	13
7. C	60	80	20
8. E	50	82	32
9. C	61	76	15
10. C	42	66	24

Listing of Data from the University of Nebraska Junior Student Scores on Pre-Test, Post-Test, and Gain

Experimental Group 3

STUDENT	PRE-TEST	POST-TEST	GAIN
1. H	83	86	3
2. H	74	92	18
3. H	56	75	19
4. H	60	83	23
5. H	53	83	30
6. H	60	85	25
7. H	73	79	6
8. H	62	83	21
9. J	56	87	31
10. J	87	100	13
11. J	68	97	29

Listing of Data from the University of Nebraska Junior Student Scores on Pre-Test, Post-Test, and Gain

Experimental Group 4

STUDENT	PRE-TEST	POST-TEST	GAIN
1. M	66	94	28
2. M	89	90	1
3. M	79	88	9
4. N	62	83	21
5. N	74	86	12
6. N	83	89	6
7. P	74	90	16
8. P	79	83	4
9. P	63	80	17

Listing of Data from the University of Iowa Junior Student Scores on Pre-Test, Post-Test, and Gain

Control Group 1

STUDENT	PRE-TEST	POST-TEST	GAIN
1. G	59	80	21
2. K	75	95	20
3. K	67	74	7
4. K	52	78	26
5. P	49	95	46
6. W	85	99	14
7. W	47	85	38
8. W	48	74	26
9. W	72	89	17
10. W	50	89	39

Listing of Data from the University of Iowa Junior Student Scores on Pre-Test, Post-Test, and Gain

Control Group 2

STUDENT	PRE-TEST	POST-TEST	GAIN
1. B	72	98	26
2. B	37	73	36
3. B	68	100	32
4. G	75	91	16
5. G	62	101	39
6. H	56	93	37
7. H	65	92	27
8. T	74	95	21
9. W	57	88	31
10. W	62	82	20
11. W	70	98	28
12. W	69	85	16
13. W	68	96	28

Listing of Data from the University of Iowa Junior Student Scores on Pre-Test, Post-Test, and Gain

Control Group 3

STUDENT	PRE-TEST	POST-TEST	GAIN
1. B	55	83	28
2. B	70	81	11
3. B	84	93	9
4. B	71	102	31
5. B	87	101	14
6. B	55	85	30
7. C	56	88	32
8. D	59	95	36
9. D	57	73	16
10. F	57	100	43
11. F	62	92	30

Listing of Data from the University of Iowa Junior Student Scores on Pre-Test, Post-Test, and Gain

Control Group 4

STUDENT	PRE-TEST	POST-TEST	GAIN
1. C	48	82	34
2. D	55	81	26
3. E	97	98	1
4. F	77	86	9
5. F	67	82	15
6. K	54	85	31
7. L	57	86	29
8. M	56	89	33
9. M	51	85	34
10. M	72	79	7
11. F	55	91	36

Listing of Data From the University of Iowa Junior Student Scores on Pre-Test, Post-Test, and Gain

Experimental Group 1

STUDENT	PRE-TEST	POST-TEST	GAIN
1. P	58	92	34
2. S	53	89	36
3. S	38	82	44
4. S	64	89	25
5. S	49	94	45
6. S	70	99	29
7. S	48	88	40
8. R	67	97	30
9. W	53	98	45

Listing of Data from the University of Iowa Junior Student
Scores on Pre-Test, Post-Test, and Gain

Experimental Group 2

STUDENT	PRE-TEST	POST-TEST	GAIN
1. A	74	94	20
2. B	60	85	25
3. B	65	97	32
4. C	61	97	36
5. F	50	79	29
6. M	53	86	33
7. R	64	96	32
8. S	66	86	20
9. S	70	94	24
10. V	65	94	29

Listing of Data from the University of Iowa Junior Student
Scores on Pre-Test, Post-Test, and Gain

Experimental Group 3

STUDENT	PRE-TEST	POST-TEST	GAIN
1. A	57	87	30
2. B	66	94	28
3. C	72	96	24
4. C	53	98	45
5. F	67	105	38
6. G	64	99	35
7. H	68	94	26
8. H	58	94	36
9. H	56	96	40
10. H	71	94	23
11. H	69	90	21
12. K	67	93	26
13. L	61	88	27

Listing of Data from the University of Iowa Junior Student Scores on Pre-Test, Post-Test, and Gain

Experimental Group 4

STUDENT	PRE-TEST	POST-TEST	GAIN
1. C	69	102	33
2. F	61	82	21
3. F	60	99	39
4. G	72	98	26
5. H	64	95	31
6. H	55	93	38
7. H	59	95	36
8. H	61	93	32
9. H	52	88	36
10. H	77	106	29
11. M	76	98	22

Listing of Data from the University of Vermont Junior Student Scores on Pre-Test, Post-Test, and Gain

Experimental Group

STUDENT	PRE-TEST	POST-TEST	GAIN
1. C	67	86	19
2. L	50	98	48
3. L	64	87	23
4. L	67	95	28
5. L	60	85	25
6. M	72	88	16
7. M	62	81	19
8. M	68	93	25
9. M	51	89	38
10. M	63	85	22
11. M	64	81	17
12. M	63	91	28
13. N	61	81	20
14. N	59	89	30
15. O	49	64	15
16. P	36	78	42
17. A	57	84	27
18. B	56	75	19
19. B	51	85	34
20. R	51	82	31
21. C	44	90	46
22. D	67	90	23
23. F	42	82	40

Listing of Data from the University of Vermont Junior Student
Scores on Pre-Test, Post-Test, and Gain

Control Group

STUDENT	PRE-TEST	POST-TEST	GAIN
1. P	56	71	15
2. P	57	82	25
3. P	65	99	34
4. R	62	78	16
5. S	51	75	24
6. S	55	66	11
7. S	50	85	35
8. S	58	81	23
9. S	55	79	24
10. S	57	69	12
11. S	51	89	38
12. S	51	79	28
13. V	41	77	36
14. W	67	80	13
15. F	67	86	19
16. F	55	82	27
17. G	72	89	17
18. H	53	83	30
19. H	42	73	31
20. H	63	82	19
21. J	71	87	16
22. K	50	72	22

Listing of Data from the California College of Medicine Sophomore Student Scores on Pre-Test, Post-Test, and Gain

Control Group

STUDENT	PRE-TEST	POST-TEST	GAIN
1. A	42	77	35
2. A	46	79	33
3. B	47	82	35
4. B	31	68	37
5. C	49	80	31
6. C	44	73	29
7. C	46	73	27
8. C	49	85	36
9. D	41	78	37
10. D	48	69	21
11. E	42	71	29
12. F	51	68	17
13. F	44	87	43
14. F	45	76	31
15. G	45	58	13
16. G	50	79	29
17. H	39	72	33
18. H	48	79	31
19. H	51	80	29
20. H	40	69	29
21. K	50	77	27
22. L	42	76	34
23. M	43	73	30
24. M	41	85	44
25. M	41	83	42

California College of Medicine

Control Group Continued

STUDENT	PRE-TEST	POST-TEST	GAIN
26. N	44	74	30
27. O	62	75	13
28. P	52	78	26
29. P	51	79	28
30. P	38	80	42
31. P	51	83	32
32. R	40	72	32
33. S	47	69	22
34. S	45	72	27
35. S	65	95	30
36. S	37	59	22
37. S	44	75	31
38. S	43	79	36
39. T	40	65	25
40. T	42	68	26
41. W	47	79	32
42. W	53	84	31
43. W	49	84	35
44. W	43	83	40
45. W	41	69	28

Listing of Data from the California College of Medicine Sophomore Student
Scores on Pre-Test, Post-Test, and Gain

Experimental Group

STUDENT		PRE-TEST	POST-TEST	GAIN
1.	A	38	82	44
2.	B	47	87	40
3.	B	47	79	32
4.	C	53	86	33
5.	C	44	84	40
6.	C	53	79	26
7.	C	44	79	35
8.	C	37	60	23
9.	D	46	83	37
10.	D	44	71	27
11.	D	57	77	20
12.	F	47	94	47
13.	F	45	85	40
14.	F	32	72	40
15.	G	39	79	40
16.	G	37	83	46
17.	G	48	80	32
18.	H	52	98	46
19.	H	57	89	32
20.	H	38	79	41
21.	H	49	85	36
22.	J	49	86	37
23.	K	44	80	36
24.	M	60	86	26
25.	M	54	88	34

California College of Medicine

Experimental Group Continued

STUDENT	PRE-TEST	POST-TEST	GAIN
26. M	39	82	43
27. N	51	89	38
28. O	42	74	32
29. P	43	85	42
30. P	53	94	41
31. P	44	64	20
32. P	43	81	38
33. R	56	97	35
34. R	53	74	21
35. S	48	74	26
36. S	46	84	38
37. S	48	76	28
38. S	43	75	32
39. S	46	75	29
40. T	47	71	24
41. T	53	74	21
42. V	46	70	24
43. W	53	86	33
44. W	47	75	28
45. W	54	80	26
46. W	49	91	42
47. Z	46	90	44

APPENDIX O

TALLY SHEET OF ATTITUDE SURVEY FOR "CONTENT" TEXT WITHIN SIX SCHOOLS

SCHOOL CODE

A = Medical College of Georgia, 1963-64
A' = Medical College of Georgia, 1964-65
B = University of Nebraska College of Medicine
C = State University of Iowa School of Medicine
D = University of Vermont College of Medicine
E = University of North Carolina College of Medicine
F = California College of Medicine

SUMMARY OF ATTITUDE SURVEY

SCHOOL CODE

	A	A'	B	C	D	E	F
1. Before I began this programmed text, my feeling about such texts was one of							
1. Strong approval	8	6	2	5	2	0	9
2. Approval	13	25	20	10	3	2	19
3. Neutral - no opinion	21	50	18	23	12	12	13
4. Disapproval	3	3	1	2	4	0	4
5. Strong disapproval	1	0	0	2	1	0	1
2. About halfway through the programmed text I felt that the programmed learning method was							
1. Excellent	12	11	6	[illegible]	2	1	10
2. Very good	25	49	15	16	3	5	14
3. All right	8	26	16	15	11	6	18
4 Poor	1	7	2	5	3	2	3
5 Completely unacceptable	0	0	1	0	0	0	0
Now that I have completed the course, I think this form of programmed teaching is							
1. Excellent	18	26	4	5	4	1	10
2. Very good	24	52	26	20	5	7	19
3. All right	3	8	8	15	8	4	10
4. Poor	0	3	0	2	5	1	3
5. Completely unacceptable	0	0	0	0	0	1	2
4. Compared to MOST teaching methods I have encountered, this form of instruction is							
1. Far superior	17	11	3	3	2	1	7
2. Better	29	65	25	22	5	6	25
3. About the same	0	9	9	9	2	3	9
4. Inferior	0	5	1	4	12	4	4
5. Extremely inferior	0	0	1	0	0	0	0
This method of study, compared to other methods of instruction usually encountered is							
1. Very much easier	12	15	8	7	0	2	16
2. Easier	32	66	25	32	17	9	19
3. No different	2	9	4	1	2	0	6
4. More difficult	0	2	0	0	3	3	4
5. Very much more difficult	0	0	0	0	0	0	0

SUMMARY OF ATTITUDE SURVEY

	SCHOOL CODE						
	A	A'	B	C	D	E	F
6. I feel my study time spent on this programmed course was							
1. Used very profitably	23	33	6	6	3	2	10
2. Well used	18	40	17	20	6	5	17
3. Adequately spent	5	11	14	4	7	5	10
4. Poorly used	0	2	1	2	5	1	7
5. Largely wasted	0	0	1	0	0	0	0
7. The programmed material was intellectually challenging							
1. Throughout	5	7	2	2	0	1	3
2. Most of the time	29	56	21	18	6	3	15
3. Sometimes	13	20	15	16	10	4	22
4. Infrequently	0	5	1	6	6	1	2
5. Very rarely	0	0	0	1	0	3	1
8. I looked ahead before I wrote my answers							
1. On no occasion	9	0	0	0	0	2	8
2. Rarely	24	30	15	24	10	5	15
3. Sometimes	11	59	6	17	7	4	19
4. Often	1	2	5	1	3	2	2
5. Nearly every time	0	0	1	0	0	1	1
9. I was sure of my answer							
1. Nearly every time	3	4	1	2	0	0	1
2. Most of the time	36	62	27	33	17	0	37
3. Sometimes	5	24	10	5	5	4	6
4. Seldom	0	2	1	0	0	0	0
5. Almost never	0	0	0	0	0	0	0
10. I checked and re-wrote my answers							
1. Always	25	31	18	21	10	7	26
2. Usually	11	36	6	10	5	4	11
3. Sometimes	3	13	7	8	4	1	6
4. Seldom	2	8	4	2	1	1	2
5. Never	3	0	1	0	2	0	0
11. Writing out the answers in the book (rather than just thinking about them) is							
1. Most valuable	34	34	9	12	6	3	19
2. Helpful	7	41	24	23	9	8	18
3. All right	3	10	4	4	4	1	5
4. Not very helpful	0	6	0	2	3	0	2
5. Wasted effort	0	1	1	0	1	2	1

SUMMARY OF ATTITUDE SURVEY

	SCHOOL CODE						
	A	A'	B	C	D	E	F
12. Class or group discussions would have been							
1. Most helpful	0	15	9	10	4	0	5
2. Helpful	15	32	16	16	10	3	8
3. All right	4	20	10	6	5	6	14
4. Not very helpful	5	22	4	8	3	2	13
5. Worthless	1	3	0	0	0	3	5
13. The format of the pages in the programmed text is							
1. Very good	13	20	6	7	7	6	16
2. Good	21	54	18	17	6	4	20
3. All right	10	16	13	15	6	4	7
4. Not very good	1	2	2	3	1	0	2
5. Bad	1	0	0	0	1	0	0
14. The explanations in this program are							
1. Excellent	20	20	10	5	4	3	12
2. Good	19	63	17	18	12	8	26
3. Acceptable	5	9	11	9	6	3	7
4. Inadequate	0	2	1	8	0	0	0
5. Totally inadequate	0	0	0	0	0	0	0
15. The illustrations are							
1. Excellent	21	22	11	0	5	4	11
2. Good	14	43	13	14	12	7	24
3. All right	8	24	13	13	3	3	9
4. Poor	1	3	2	6	4	0	1
5. Worthless	0	0	0	0	0	0	0
16. In coverage of the subject, the programmed course is							
1. Much too detailed	0	0	0	1	0	1	1
2. A little too detailed	4	3	3	4	5	1	8
3. About right	32	74	29	23	15	8	31
4. A little too brief	8	13	5	13	1	3	6
5. Far too brief	0	0	0	2	0	0	0
17. In teaching me to apply my knowledge of my patients this program I expect will be							
1. Very valuable	12	22	12	2	4	2	5
2. Valuable	26	52	24	21	11	6	24
3. All right	5	14	9	16	8	5	8
4. Of little help	1	4	1	7	0	1	4
5. Of no help	0	0	0	0	0	0	1

SUMMARY OF ATTITUDE SURVEY

	SCHOOL CODE						
	A	A'	B	C	D	E	F
18. The portions of the subject indicated by the title of the course were taught by the program							
1. Extremely effectively	9	10	0	1	3	3	6
2. Very capably	30	55	26	22	9	6	21
3. Acceptably	4	28	12	16	9	4	15
4. Inadequately	1	0	1	1	1	1	0
5. Very poorly	0	0	0	0	0	0	0
19. For some other medical subjects I would choose programmed instruction							
1. In preference to all other forms	17	17	8	3	2	1	15
2. With approval	25	54	22	32	10	8	18
3. Maybe	4	12	4	2	6	4	6
4. With hesitation	0	7	3	3	2	1	2
5. Only as last resort	0	2	1	0	2	0	4
20. Programmed instruction, if widely and appropriately used in the medical field, would							
1. Vastly improve the instruction	28	26	9	10	1	1	12
2. Be good	15	50	25	20	7	8	20
3. Not hurt anything	1	11	6	7	3	2	9
4. Be bad	1	4	1	3	10	3	3
5. Ruin it	0	0	0	0	1	0	1
21. If this text were available in a bookstore, I would recommend that others							
1. Buy it and use it frequently	33	56	17	11	7	5	21
2. Buy it and use it occasionally	8	28	13	18	7	5	15
3. Borrow but don't buy it	3	4	7	11	7	3	3
4. Accept it as a gift only	0	5	0	0	2	1	3
5. Avoid it completely	0	0	1	1	0	0	2
22. This programmed course presented vocabulary problems for which I had to use a medical dictionary							
1. Not at all	27	44	23	23	15	8	26
2. Very little	16	35	15	10	5	5	16
3. Some	3	9	2	1	1	1	3
4. Often	0	3	0	0	0	0	0
5. Very often	0	0	0	0	0	0	0

SUMMARY OF ATTITUDE SURVEY

	SCHOOL CODE						
	A	A'	B	C	D	E	F
23. In covering the subject matter in this programmed text, I also read the same material in other texts							
1. Nearly always	10	14	7	16	1	8	11
2. Usually	11	28	3	5	3	2	9
3. Sometimes	12	31	12	8	7	3	12
4. Rarely	7	14	4	6	4	1	5
5. Not at all	5	5	13	7	5	0	8
24. How confident are you about your knowledge of the subjects covered in the programmed text?							
1. Very sure	4	5	3	2	4	1	5
2. Moderately sure	26	56	21	25	9	8	21
3. Fairly sure	14	25	11	10	4	4	14
4. Somewhat doubtful	2	8	4	2	4	1	5
5. Very unsure	0	0	1	1	0	0	0

APPENDIX P

TALLY SHEET OF ATTITUDE SURVEY FOR "APPLICATIONS" TEXT FOR THE MEDICAL COLLEGE OF GEORGIA

SUMMARY OF QUESTIONNAIRE

1. Compared to the linear program, I find the case presentations to be

1. Completely acceptable	15
2. Acceptable	22
3. All right	4
4. Unacceptable	0
5. Completely unacceptable	0

2. The best use of the two books would be to study

1. Only this one	0
2. ------------	1
3. Both together	39
4. ------------	1
5. Only the linear text	0

3. This book of case presentations is

1. Much too long	0
2. Long	5
3. All right	32
4. Short	3
5. Much too short	1

4. In teaching me to apply my knowledge to my patients this program, I expect, will be

1. Most valuable	11
2. Valuable	25
3. All right	3
4. Of little help	0
5. Of no help	0

5. If this text were available in a bookstore, I would recommend that others:

1. Buy it and use it frequently	16
2. Buy it and use it occasionally	20
3. Borrow but don't buy it	4
4. Accept it as a gift only	0
5. Avoid it completely	0

APPENDIX Q

SUMMARY OF ORAL EXAMINATION GRADES FOR TWO YEARS BY EXPERIMENTAL AND CONTROL GROUPS OF JUNIOR MEDICAL STUDENTS AT THE MEDICAL COLLEGE OF GEORGIA, 1963, 1964, and 1965

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SUMMARY OF ORAL EXAMINATION GRADES FOR JUNIOR MEDICAL STUDENTS
MEDICAL COLLEGE OF GEORGIA
1963-64

CONTROL GROUP A

NAME	DENNIS & NEWTON COMPOSITE	AYDAR	BRYANS	O'ROURKE	TALLEDO	WILDS
1. A	3	3	2	3	2	3
2. A	2	3	3	2	1	2
3. C	2	2	2	2	2	2
4. C	2	2	2	2	1	2
5. C	1	2	2	2	1	1
6. D	2	2	2	2	1	2
7. E	0	3	2	2	1	0
8. E	2	2	2	2	2	2
9. G	3	2	3	3	1	3
10. G	2	2	2	3	1	2
11. G	2	2	2	2	1	2
12. H	3	2	2	2	1	3
13. H	2	2	2	2	2	2
14. K	3	2	2	2	2	3
15. L	1	2	2	3	1	1
16. L	4	2	3	3	2	4
17. M	3	2	3	2	2	3
18. M	1	3	2	3	2	1
19. N	1	1	2	2	1	1
20. R	3	3	2	2	2	3
21. S	1	3	2	2	1	1
22. W	1	2	2	2	1	1
23. W	2	2	2	2	2	2

SUMMARY OF ORAL EXAMINATION GRADES FOR JUNIOR MEDICAL STUDENTS
MEDICAL COLLEGE OF GEORGIA
1963-64

EXPERIMENTAL GROUP B

NAME		DENNIS & NEWTON COMPOSITE	AYDAR	BRYANS	O'ROURKE	TALLEDO	WILDS	ZUSPAN
1.	A	3	2	2	3	1	3	3
2.	B	3	2	3	3	1	3	4
3.	B	4	3	3	2	2	4	4
4.	C	2	3	2	2	2	2	4
5.	C	3	3	3	2	2	3	4
6.	D	2	2	2	2	1	2	2
7.	D	2	2	2	2	2	2	1
8.	D	3	2	2	1	1	3	3
9.	F	4	4	4	4	1	4	4
10.	H	3	2	2	2	2	3	2
11.	H	2	3	2	2	2	2	2
12.	J	1	2	3	2	2	1	2
13.	J	3	2	2	3	1	3	4
14.	M	2	2	3	2	2	2	1
15.	M	2	2	2	1	1	2	3
16.	P	4	3	1	3	2	4	3
17.	P	1	3	2	3	1	1	3
18.	R	4	3	2	2	1	4	2
19.	S	2	2	3	2	2	2	4
20.	T	2	2	2	3	1	2	2
21.	T	2	2	2	2	1	2	2
22.	T	4	2	2	2	2	4	3
23.	T	1	2	2	2	2	1	1
24.	W	3	2	2	2	1	3	3

SUMMARY OF ORAL EXAMINATION GRADES FOR JUNIOR MEDICAL STUDENTS
MEDICAL COLLEGE OF GEORGIA
1963-64

EXPERIMENTAL GROUP B'

NAME	DENNIS & NEWTON COMPOSITE	BRYANS	O'ROURKE	TALLEDO	WILDS	ZUSPAN
1. B	2	2	2	2	2	3
2. B	1	3	3	2	1	3
3. C	2	2	3	2	2	2
4. C	2	2	2	2	3	2
5. D	---	2	2	2	2	2
6. D	1	2	2	2	2	2
7. D	1	2	2	2	2	2
8. F	1	3	4	2	2	3
9. F	2	3	2	2	3	2
10. F	1	3	3	2	2	3
11. G	2	2	3	2	3	2
12. H	2	2	3	2	3	2
13. K	3	3	2	3	4	3
14. M	1	2	2	2	1	1
15. M	2	3	2	2	3	3
16. M	2	2	2	2	3	3
17. R	3	2	2	2	2	2
18. S	2	2	2	2	3	1
19. S	1	2	3	2	2	2
20. S	C	2	2	2	1	3
21. S	2	3	2	2	3	2
22. W	3	3	3	2	4	2
23. W	2	2	3	2	3	2

SUMMARY OF ORAL EXAMINATION GRADES FOR JUNIOR MEDICAL STUDENTS
MEDICAL COLLEGE OF GEORGIA
1963-64

		CONTROL GROUP A'				
NAME	DENNIS & NEWTON COMPOSITE	BRYANS	O'ROURKE	TALLEDO	WILDS	ZUSPAN
1. A	1	2	2	2	2	2
2. A	2	3	2	2	3	3
3. B	2	3	2	2	3	2
4. C	3	2	2	0	4	3
5. H	1	2	2	2	2	2
6. H	3	3	2	2	4	3
7. H	3	3	2	2	4	4
8. J	3	3	2	3	4	2
9. K	1	---	---	---	---	---
10. H	2	2	2	1	3	2
11. M	2	3	2	2	3	2
12. M	2	2	2	2	3	4
13. O	3	3	4	3	4	4
14. O	0	2	2	3	1	2
15. P	3	3	2	1	4	4
16. R	2	3	2	2	3	3
17. S	1	2	1	2	2	1
18. S	2	3	2	2	3	3
19. S	2	2	2	2	3	3
20. S	3	3	3	2	4	2
21. V	3	2	2	2	4	2
22. W	2	2	3	2	3	2

SUMMARY OF ORAL EXAMINATION GRADES FOR JUNIOR MEDICAL STUDENTS

MEDICAL COLLEGE OF GEORGIA

1964-65

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SUMMARY OF ORAL EXAMINATION GRADES FOR JUNIOR MEDICAL STUDENTS
MEDICAL COLLEGE OF GEORGIA
1964-65

CONTROL GROUP A

NAME	DENNIS & NEWTON COMPOSITE	TEAM I BRYANS & O'ROURKE	TEAM II NELSON & WILDS	TEAM III TALLEDO & ZUSPAN
1. B	1	2	1	2
2. B	2	2	2	2
3. B	4	2	2	2
4. C	0	2	3	2
5. C	1	2	3	2
6. C	0	2	3	1
7. D	1	3	2	3
8. F	2	2	2	2
9. F	2	2	2	2
10. G	1	2	2	2
11. G	2	2	4	2
12. G	1	2	2	1
13. G	1	2	2	2
14. H	2	2	3	3
15. K	2	2	4	3
16. L	3	3	4	2
17. M	2	2	4	3
18. M	1	2	3	1
19. R	3	---	---	---
20. R	1	3	1	1
21. S	2	2	4	2
22. S	3	2	4	4
23. W	3	3	3	3
24. W	2	2	4	2

SUMMARY OF ORAL EXAMINATION GRADES FOR JUNIOR MEDICAL STUDENTS
MEDICAL COLLEGE OF GEORGIA
1964-65

EXPERIMENTAL GROUP B

NAME	DENNIS & NEWTON COMPOSITE	TEAM I O'ROURKE & ZUSPAN	TEAM II TALLEDO & WILDS	TEAM III BRYANS
1. C	2	3	2	2
2. D	3	3	2	2
3. G	3	3	3	3
4. G	2	1	2	2
5. H	1	3	3	3
6. H	2	1	2	2
7. J	4	3	2	3
8. J	1	1	1	2
9. K	2	2	2	3
10. L	3	2	1	2
11. M	3	3½	3	1
12. M	2	2	2	2
13. M	2	3	2	2
14. M	3	3	2	2
15. M	2	2	3	2
16. N	1	2	1	1
17. O	3	1	0	1
18. Q	3	4	3	2
19. S	3	3	2	2
20. S	3	4	3	1
21. S	3	1	2	3
22. W	3	4	4	3
23. W	2	2	3	2
24. W	1	3	2	3

SUMMARY OF ORAL EXAMINATION GRADES FOR JUNIOR MEDICAL STUDENTS
MEDICAL COLLEGE OF GEORGIA
1964-65

EXPERIMENTAL GROUP B'

NAME	DENNIS & NEWTON COMPOSITE	TEAM I ZUSPAN & NELSON	TEAM II O'ROURKE & TALLEDO	TEAM III BRYANS
1. A	4	1	2	2
2. A	2	2	4	2
3. B	3	3	2	2
4. B	0	3	2	2
5. C	1	3	2	2
6. D	1	4	3	2
7. E	2	2	2	3
8. H	3	4	3	3
9. H	3	2	2	3
10. K	2	3	2	2
11. K	4	2	2	3
12. M	1	2	2	3
13. M	1	2	2	2
14. N	2	4	3	3
15. S	2	2	2	3
16. S	2	3	3	3
17. S	4	3	2	1
18. S	4	3	3	3
19. S	1	2	1	2
20. S	4	3	3	3
21. T	2	3	2	2
22. W	1	3	1	2
23. W	3	1	1½	2

SUMMARY OF ORAL EXAMINATION GRADES FOR JUNIOR MEDICAL STUDENTS
MEDICAL COLLEGE OF GEORGIA
1964-65

CONTROL GROUP A'

NAME	DENNIS & NEWTON COMPOSITE	TEAM I ZUSPAN & WILDS	TEAM II NELSON & TALLEDO	TEAM III BRYANS
1. C	2	3	2	2
2. C	1	2	2	3
3. E	1	3	1	2
4. F	3	2	2	4
5. G	3	3	2	2
6. H	0	1	1	2
7. K	2	1	2	2
8. M	3	2	1	2
9. M	3	4	2	3
10. M	1	3	2	3
11. N	2	3	2	3
12. P	3	1	2	2
13. R	2	2	2	3
14. R	3	3	2	3
15. R	2	2	3	2
16. R	1	1	2	2
17. S	4	3	2	3
18. V	0	2	1	2
19. W	3	1	3	2
20. W	4	3	3	2
21. W	2	3	1	3